



Background and action paper on OER

A background and action paper for staff of bilateral and multilateral organizations at the strategic institutional education sector level

2 May 2011

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Report prepared for The William and Flora Hewlett Foundation



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Acknowledgements

The authors would like to acknowledge many people who have generously provided contributions, guidance and comments during the creation of this report. Amongst those who have assisted are:

Mark Bellinger (USAID)

Antony Bloome (USAID)

Greg Butler (Microsoft)

Neil Butcher (OER Africa)

Abel Caine (UNESCO)

Sir John Daniel (Commonwealth of Learning)

Ulf-Daniel Ehlers (European Foundation for Quality in E-Learning)

Julien Hofman (Independent law expert)

Derek Keats (University of the Witwatersrand)

John Lesperance (Commonwealth of Learning)

Bob Moon (The Open University -UK)

Kathy Nicholson (William and Flora Hewlett Foundation)

Tobias Schonwetter (Creative Commons, South Africa)

Mike Trucano (World Bank)

Trudi van Wyk (Commonwealth of Learning)

Zeynep Varoglu (UNESCO)

David Wiley (Brigham Young University)



Executive Overview

Intended Audience

Many reports have been written about OER by a number of authors and organizations. It is therefore not the intention of this report to re-research what has been done before, but to rather provide a condensed summary, background and action paper for use by institutions and agencies that are considering expanding their work in Open Educational Resources. This report should be provided to participants ahead of the meeting or workshop, to give sufficient time for pre-reading and additional personal research.

The intended audiences of this paper are those people who are associated with or work for international agencies, bi- and multilateral agencies, and agencies that fund educational programs.

If you are looking for a quick overview of OER, we recommend you read pages 9 to 11. If you then want more information than this, continue with pages 12 to 40. If you find you still have more questions after this, you may find them in the Appendix that start from page 41. There are a number of online discussions on the topic that may also help you to gain more traction with OER.

Purpose of the paper

The report is structured to provide a great deal of information in a compact manner. Links are provided throughout the report in two ways for the reader who wants more information for further research and investigation. For the on-screen reader, there are hyperlinks. Each hyperlink is also included in the footnotes so that the reader who prefers printed matter will be able to read the links and type them into an Internet browser. As far as possible, hyperlinks have been provided in the table of contents to the relevant text in the report, so that the reader may quickly move from the table of contents to sections of the text.

The original version of the report will remain available as a PDF so that anyone may compare emerging versions with the one that is published through this project. Project description:

<http://oerbackgroundpaperdraft.pbworks.com/w/page/37756032/FrontPage>

The source document is at:

http://www.paulwest.org/public/Background_and_action_paper_on_OER.pdf

Or

<http://tinyurl.com/6km22zu>

A version of this report will be uploaded to a public wiki so that others may, in time, add to it.

Comments and suggestions for improvements to this report can be sent to: oerreportcomment@pgw.org



Executive Summary

Open Educational Resources or “OER” have emerged mostly over the last 10 years. Distributing free educational resources can be traced back much further back. What has turned into a “movement”, relates strongly to the connection to resources being digitized and shared over the Internet, and the particular copyright licensing associated to the resource. Duplicating resources that are in a physical format such as paper or disc carries a significant cost. The more copies that are shared, the higher the costs. The higher the duplication and distribution costs, the more limited the possible distribution of the resource.

A working definition of Open Educational Resources has been included in this report to help provide a bridge between the various definitions found in the literature:

Open Educational Resources (OER) are digitized educational resources that are freely available for use by educators and learners, without an accompanying need to pay royalties or license fees. The digitized resources may be shared via the Internet or using media such as disk-drives. OER are usually, but not exclusively, licensed using Creative Commons licenses. Both the original owners of the material and the subsequent users need to clearly understand the terms of these contracts to appreciate the ways in which materials may be remixed and shared.

Firstly, this definition takes the narrow opinion that an OER should be digitized so that it may be sharable at no (or negligible) incremental cost via the Internet. Where an object needs to be in a physical format before it can be practically used, that resource could still be shared in digital format (e.g. The designs or plans may be published and transmitted), and the physical form re-created by the user on receipt of the digital version. This is to support the school of thought that the replication of the resource must be as ‘near to free’ as possible, while not eliminating the possibility of sharing physical resources.

Secondly, the definition takes the broader view that not all people or organizations are alike and so different copyright licenses will continue to emerge. A suggestion is provided in the report’s appendix on how content may be cited when mixed from works carrying different copyright licenses, providing that all the licenses of works used allow for the sharing of works free of charge, to accommodate this emerging reality.

Copyright laws have been developing and protect the rights of the owner of a published work, which helps to protect the business rights for people and businesses whose livelihood depends on the sale of their works. In academe however, many people would like to share knowledge widely for a number of reasons. An institution that produces excellent educational resources might like to show the world how good it is by allowing anyone to use their resources. They know that every time a resource is used from their institution, they gain visibility and prestige which cannot be purchased with advertising money. If the publishing institution or educator has really produced a good quality resource, their name could potentially become synonymous with high quality education, thereby attracting accolades.

Advances made by [Creative Commons](http://creativecommons.org/)¹ have supported the opportunities for individuals and organizations to publish works free of charge for others to use. When a Creative Commons license is selected and displayed in a resource, the owner of that resource tells potential users of the work, that it may be used free of charge. Different options provided by Creative Commons enable the owner of the work to communicate restrictions they would like observed, such as the work may be used for non-commercial purposes only, or that if a resource is adapted (i.e. a derivative work is created), that the new work must also be shared. The OER movement owes much to Creative Commons for creating a license framework within which it can now operate.

Institutions and individuals who release resources as OER have a world of choice as to where they publish these resources. Many institutions have chosen to create their own website or repositories of resources. In order to find these resources, potential users, such as teachers, lecturers and learners must search the websites one-by-one, or use one of the aggregation search engines that have emerged. There is no standard method of meta-tagging resources or storing them, neither is there a standard method of licensing resources, other than that there is general consensus that one of the Creative Commons licenses should be used.

¹ <http://creativecommons.org/>



Momentum in the OER movement has been achieved by the William and Flora Hewlett Foundation and others that invested millions of dollars (US) in projects that have created resources, created repositories, supported institutions to review their policies and trained educators how to better use computers to create and share learning resources. If the funded projects have been successful, institutions and governments should now begin to recognize the potential of OER. One only needs to imagine if a similar course is created by a team of educators in each of nearly 200 countries around the world, what duplication of effort must exist. Would taxpayers not be pleased to hear that the best available learning content had been adapted and contextualized to local conditions, saving millions of dollars across all subjects and levels of study?

The industry that may be faced with the greatest change in its business model may be the commercial publishing industry. In the recent past, we saw how the business model of an encyclopedia could be dramatically changed by another one that is offered free of charge. The publishing industry seems poised to face such a challenge on a global scale. For educators, the 'not invented here' syndrome will have to give way to environments that encourage the sharing of resources that support productive use of time, rather than re-invention of existing resources.

One of the reasons why OER could fulfill an important global role, is that it may assist in providing opportunities for the few hundred million people who are outside the formal education system and have little or no hope of ever entering it.

In cases where bandwidth remains unavailable, equipment exists to provide for OER to be shared. It however needs to be deployed and used. Widely available and cost effective bandwidth is crucial to providing access to learning resources, and in many cases, education. Affordable and widely accessible bandwidth is an area of infrastructure development for urgent attention by governments.

An educated and skilled workforce is needed in all countries, as quality education is critical for economic social development. The OER Movement has the potential of contributing towards closing the gap between those who are able to access formal education systems and those who have little chance of entering or re-entering one. The OER movement also has the potential of advancing research through sharing knowledge (freedom of information), rather than proliferating proprietary sentiments over knowledge created in institutions of learning.



Summary of recommendations

Multilateral and Technical Agencies

Multilateral agencies that fund large projects that include the creation of manuals and resources, could improve efficiency if they use base resources (OER) that have been created in other projects. Likewise, manuals and resources created by multilateral and international agencies could be put to more productive use if they show, by example, that all the resources they produce are being shared free of charge. Donor coordination can help to ensure that each development investment made is productive and not duplicated at all by other investments by other or their own agencies. Development and technical agencies that implement projects funded by governments and international and multilateral agencies, can make a significant difference in ensuring that investments do not get diluted by being repeated in more than one activity. Agencies that provide grant funding or other project support can encourage use and re-use of existing OER and require an open license for any resources created with agency support. A long-term plan is needed to inform international and multilateral agency staff of OER and the benefits of using OER. Further work is needed in forming global curriculum guidelines so that when an OER is created in one country, it is a good base OER for another country. Examples from the finance and medical fields could prove useful in understanding how this might be accomplished.

Technical methods to share OER across multiple platforms, using different technologies is needed. While we become more diverse around the world, we need technology to support the freedom of making personal and institutional choices that differ between regions, countries, communities, institutions and individuals. Technologies must remain in support and not become the 'masters' of OER.

Governments

Some governments have started to make changes to policies that support the creation and sharing of learning resources. As more governments recognize the benefits in terms of cost savings and improved quality, it is likely to become a norm to publish learning resources as OER in all countries. Governments can facilitate the sustainable implementation of OER by creating incentives for use and re-use, removing barriers to OER adoption, and funding technical infrastructure to increase access to OER. They can also encourage openness as a component of public policy by requiring all publicly funded materials to carry a public license, publishing educational research through open access journals, making more government data publicly available and supporting open source software.

Institutions

Institutions, especially those that face financial challenges, could benefit from reviewing the potential savings in costs of improving or creating quality learning resources through the use of OER. Institutions of learning have the potential to increase numbers of learners they support, if they invest in the technologies that enable learners to access learning materials that are available free of charge online.

Educators

The more educators share learning content with the world, that helps to cover all curriculum at all levels, the better the chance of all teachers being able to offer better education (if they have the necessary minimum equipment and bandwidth). In the same vein that learners are encouraged to actively participate and share in the learning process, educators are also encouraged to actively participate and share in the creation of learning resources and especially OER.

Information Specialists

Information specialists, including librarians and knowledge workers need to provide support for OER in a similar way in which they do for journals, textbooks and online information, both for learners and educators.



Learners

Where OER are available, learners need to know and have the resources to access it to enable OER to be optimally used.



What is OER?

This section of the report provides an overview of Open Educational Resources. It may help the reader who is relatively new to the field and who needs to gain an overall understanding of OER and why OER may matter to the reader.

OER are digitized educational resources that can be shared over the Internet. They can be edited or customized, combined with other resources and new versions created. New versions may be called ‘derivatives’ to the legal fraternity and ‘mashups’ or ‘remixes’ to other people. For a resource to be optimally sharable (without incremental costs), it needs to be in a digital format that other people can use - they need to be able to open it with computer programs (or ‘applications’, or ‘apps’) that they have on their computers. Resources that cannot legally be edited or modified in any way may still be sharable, but usually need to be used in their entirety and not in parts.

Once an OER in digital format has been selected for use, it may be converted into print or other physical format to make it accessible for instance to people who do not have computers or Internet access; or for art classes or medical training facilities.

OER may be text files, like ‘lecture notes’ that have been written so that a learner may read and learn; they may be video files that show how something is done or even show a lecturer giving a classroom lecture. OER may be a single picture of something that can help a teacher or an interactive science experiment in a virtual science laboratory. The possibilities are wide, but the common strand is that the item being shared can be shared at no cost via the Internet, provided the user has an internet connection.

To overcome the limitations imposed on learners who do not yet have internet access, many OER are stored on computer disk drives which are then plugged into computers in institutions or other organizations. These are rather like local or offline collections of resources that are like the Internet, but limited in the number of resources that can be accessed.

Free educational resources have been around for decades, but prior to the Internet being in wide use, they might have been printed books that were given to people. The cost of duplication always limited how widely resources could be shared. OER, being digitized, can be legally duplicated digitally as many times as anyone likes if there is an Internet connection. The cost never rises if there is a reasonable Internet connection. The costs only rise when the materials are printed or if a person is paying for Internet access per minute or for the volume of data transmitted to their computer.

OER are being created, used and customized by individual people, organizations and institutions. Some government departments have realized they can reduce the cost of distributing learning resources, while building up local small industries by investing in OER projects. OER enable learning resources to support local printing industries, because they can be printed close to where they are going to be used - if they are printed at all. OER enable schools and higher education institutions to reduce the number of books that are printed by allowing learners to use computers, tablet PCs or handheld computers (including smart phones) to read their books.

Providing learners of all ages with access to materials that are free of charge via the Internet, widens the access to these materials to more people who might not otherwise have been able to utilize them. With hundreds of millions of young people out of schools and with no hope of ever being admitted even to a secondary school, OER provides a window of opportunity to give many more people access to learning.

In addition to the technical formats that are needed to enable one person to access and use the resources another user uploads to the Internet, specific copyright licenses have emerged to support the sharing of resources. The most commonly used copyright licenses are provided by Creative Commons and allow a range of flexibility for users to choose what she or he wants to allow others to do with the resources they have created without having to ask permission. Should the user wish to have more rights than what has been communicated in the copyright license, the author or ‘rights holder’ can be contacted and permission requested.

If standardized core curriculum outlines existed in the world and funds are directed to the creation of high-quality resources for all topics, in all languages and levels, more people could gain the benefit of education. In the words of



Nelson Mandela²: 'Education is the most powerful weapon which you can use to change the world'. (Brainy Quote, 2011)

Why do OER Matter?

'Contributing open educational resources may make significant content available online for students, academics and life-long learners on a global level. Shared ideas, experience and knowledge may help inspire new research and further learning. Consider the teaching, learning and research resources regularly accessed online, and the increasing number which are provided as open education resources. It has been suggested that uploading open education resources to the Internet facilitates a synergy of intellectual exchange, participation in global collaboration and contribution to an international educational commonwealth. Posting academic content online ought not to devalue its authorship, but rather promote the dissemination of knowledge and the recognition of its originators.

Open education resources in the form of course content could become institutional recruiting tools, allowing prospective students the opportunity to examine classes offered and teaching modalities, and make informed choices about their academic path. Students presently enrolled at the institution may access important content and resources to enhance breadth and depth of learning. Former students may use open resources to review foundational concepts and ideas from classes they have successfully completed.' (CAETL, 2011).

Reasons and motivations for introducing OER vary widely, depending on the local context. OER Africa provides a range of reasons for the African content, including:

- 'African higher education institutions are seriously structurally under-funded for the core function they are expected to discharge.
- This has led to corresponding paucity of institutional and individual capacity to teach in many domains of higher education. Academics are overtaxed in time and ability to teach, reducing time available for ongoing program and materials development.
- Because academics are over-extended, they may be reluctant to alter the current passive teaching and learning paradigm to one that is more active on the part of the student, as this generally increases the teaching burden.
- In many higher education programs on the continent, the amount of money available to run those programs is inadequate to meet the educational needs of enrolled students, as well as to cover the costs of faculty time required both to design and run quality learning experiences.
- There are too few learning resources for learners and lecturers in African universities, and many of those available are too expensive to be purchased by universities or students.
- Much existing content available to and within African universities is based on weak and largely outmoded educational design principles. Although a high priority, updating such content is very difficult to do in contexts where faculty members are already overtaxed and often need extensive support and capacity development to be able to design effective educational materials.
- Although improvements will occur over time, there is limited ICT infrastructure to gain access to up-to-date information available on the Internet and to participate in inter-institutional, geographically dispersed collaborative activities.'

(OER Africa, 2011).

Other institutions in different contexts have varying reasons for releasing learning resources free-of-charge for anyone to use. Professor Charles Vest, President Emeritus of the Massachusetts Institute of Technology (MIT) spoke of how faculty from MIT would take their teaching resources with them to other institutions, adapting these materials to new environments. He realized that a more formal process, that still made use of the Internet's freedom to transfer materials, could help to benefit education at 'Internet time' (Vest, 2006).

² <http://www.brainyquote.com/quotes/quotes/n/nelsonmand157855.html>



The African situation outlined by OER Africa is unlikely to be unique if one considers the need for and commitment to Education For All (EFA). The focus on EFA is now resulting in a ‘bubble’ of learners reaching secondary school, who need to be accommodated in tens of thousands of schools that do not exist. Governments and development agencies will be unable to build sufficient schools to accommodate the existing numbers of out-of-school youth who needs to find a place in secondary school. Institutions of Higher Education also, are under tremendous pressure to take greater numbers of learners and are at risk of simply restricting successful entrants to the ‘cream-of-the-crop’ or those with very high school marks and the highest chance of success. Needed are creative new ways for millions of learners of all ages to enter secondary and higher education and be able to enjoy enough support to have a reasonable chance of success, if they put in the effort.

The cost of developing high quality learning materials is one of three factors in Sir John Daniel’s ‘Iron Triangle’ (Daniel, Kanwar, and Uvalić-Trumbić, 2009). If institutions can reduce the cost of developing learning materials while improving quality by introducing the best available materials from other institutions around the world, proportionally more resources may be invested in learner support and ensuring the success of learners.

The [WikiEducator](http://wikieducator.org)³ community focuses specifically on the creation, customization and sharing of OER and explains their reasons as follows: ‘The aim of OER is to improve access to learning opportunities by sharing knowledge and learning resources. By joining this international community of educators you can save time, cut costs and contribute to improving the quality of learning in your own classroom and around the world. The OER movement seeks to stimulate, facilitate and catalyze growth of the pool of learning resources on the Internet which circumvent barriers to access and lift restrictions on usage, thus improving education as a social good. With OER you are free to use, adapt, mix and share the resources, and become part of this growing community.’ (WikiEducator, 2011).

[OERCommons](http://oercommons.org)⁴ explains it this way: ‘OER is a relatively new movement in education; educators and learners as well as learning institutions are driving its development. OER provides an alternative to the rising costs of education. For example, in some countries like South Africa, some educators and learners are tapping into OER as the only source for textbooks. OER provides an opportunity to try new ways of teaching and learning, many of which are more collaborative and participatory. (OERCommons, 2011)

Some educators are using OER as a way to get students more involved, using the OER process as a way to collaborate with them on content creation. This process brings students into a larger context of learning and sharing knowledge beyond the four walls of their classroom.

Flexibility is a key concept in OER – materials can be adapted for your specific needs. Because these materials can be searched by a wide variety of criteria, you can quickly find what you specifically need.’ (OERCommons, 2011).

The overall reason for OER needs to be connected with the Millennium Development Goal 2: ‘Achieve Universal Primary Education’ and the need to extend this to new goals such as Enable all learners who wish to achieve Secondary and Higher Education to be able to do so’. The OER movement is not restricted to a goal of 2015, it needs to maintain a longer-term vision such as 2025 and 2040, where any lifelong learner can enter or re-enter education at any age and have a reasonable chance of success. This success should not be frustrated by the high cost of education or education models that some consider to be firmly based in the 1400s (Kamenetz, 2010).

Cost Savings

Similar course materials are needed in countries around the world. One hears anecdotes of ‘how different can an introduction to Accounting be in two countries?’, yet every institution appears to believe that it is about to create the best learning materials for a particular course. Significant savings could be gained through the sharing of good base learning materials for each of the most popular subjects taught around the world. Costs of creating materials vary greatly, depending on the complexity, technologies and techniques used and it may therefore be difficult to guess the

³ <http://wikieducator.org>

⁴ <http://www.oercommons.org/>



cost of developing a course. That said, OER offer ministries of education and institutions a path to consider sharing materials as a viable cost-saving or quality improvement option.

Continuous Improvement

When content is published online and others have an opportunity to engage with it, it is likely that someone will find a way to improve the material. This principle has been demonstrated by Wikipedia, where subsequent edits continually improve the accuracy and quality of articles. In the case of course materials that are published on platforms where it may be edited by anyone, there is a good possibility that another person may find a way to improve them. Should the original author want to maintain his or her own version of the content, a duplicate can be created for anyone to add to, while maintaining a personal version which can be shared but not edited. This way, one version is made available for anyone to remix and use, while the personal one is for more restricted use and sharing as-is.

Learning Efficiencies and Effectiveness

As described above, the efficiency of course materials (reduction in costs) may be improved through the use of OER, while the effectiveness may be improved by borrowing from some of the best available minds in the subject area in the form of source materials and improvements to materials. Institutions have little to lose by receiving materials from other institutions if they are appropriate in content, and can reduce the institutional work-load of developing and updating course materials. Where institutions still ‘feel proprietary’ about their content, they may be justified in undertaking a costing of the potential savings of receiving and using learning materials from other institutions before they begin to release materials. This may help to show the ‘free trading’ principle of OER.

Accessibility

Accessibility refers to (1) access to OER that may be used, (2) having the software and skills to be able to customize the OER and (3) having the technology to be able to access digitized OER that are online. These issues are addressed elsewhere in this report.

Changing teaching and learning practices

The barriers to using OER range widely from institutional policies to the perceived need for personal or institutional gain through the selling of learning content. Where educators are able to reduce costs through the use of OER, this needs to be taken into account and not used against educator who want to use OER. The potential exists for an institution to consider an educator to not be doing his or her job by using OER; this is a particularly worrying point if one considers the arguments of institutional effectiveness and cost savings in a time of rising costs of education.

Greater understanding of OER, its cost savings, potential improvements in the quality of materials and the legal implications of the different Creative Commons license options need to be understood.



How is OER being shared today and by whom?

The OER movement has been forming through projects funded by organizations that have recognized the potential of sharing educational works free of charge. We will first review a number of projects that have expanded the availability of examples of OER around the world and then list some of the organizations that have provided substantial funding to enable these projects to be carried out. The projects are firstly listed in the schooling sector (primary and secondary education) and secondly in the tertiary or higher education systems, followed by the main funding agencies that have made this work possible. More information on each is available on the respective websites. Finally, the section includes some thoughts on what will be needed to continue to advance the use of OER. Sites that have been excluded from the list, include those that have ‘all rights reserved’ copyright or show no copyright notice at all (making it illegal to copy the works) and where no digital versions can be found for downloading (a potential user should not have to request permission to receive the work). A directory of OER projects is also available at <http://ci.olnet.org/CILite/global.php#org-list>

K-12 sector - U.S. and International

[Teacher Education in Sub Saharan Africa, Open Educational Resources for Teacher Education in Africa](#)⁵

The website describes TESSA as: ‘a research and development initiative creating open educational resources (OER) and course design guidance for teachers and teacher educators working in Sub-Saharan African countries.’ and goes on to say ‘TESSA has produced a large bank of materials directly aimed at enhancing and improving access to, and the quality of, local school based education and training for teachers. These materials (including audio and other media) are modular in format which makes them modifiable for individual country’s specific needs. They focus on classroom practice in the key areas of literacy, numeracy, science, social studies and the arts and life skills.’ TESSA (2011). TESSA resources are used by teacher training institutions in 13 countries to supplement and in some cases, serve as foundational materials for teacher training programs. They are currently available in three languages (English, Kiswahili, and Arabic).

[MISTM Math Portal](#)⁶

U.S. state of Maine’s Impact Study of Technology in Mathematics (MISTM) was a US Government funded collaboration. ‘The core goal of the professional development program was to enable grade 7 and 8 teachers and their students in low-performing rural schools to take full advantage of universal laptop availability to enhance mathematics teaching and learning and improve student achievement in mathematics. The program incorporated interactive technology tools, including online applets, to support middle school mathematics instruction, and prepare teachers to integrate these tools into the curriculum to help students attain the Maine Learning Results standards.’ (MISTM, 2011).

List of Mathematics resources: <http://www2.edc.org/mistm/>

Higher Education - U.S. and International

[The Virtual University for the Small States of the Commonwealth, Commonwealth of Learning \(COL\)](#)⁷

A lack of textbooks and high cost of proprietary materials led the Virtual University of the Small States of the Commonwealth to look to OER as a way to increase availability of workforce skills training. ‘On behalf of Commonwealth Ministers of Education, COL is co-ordinating the development of a Virtual University for Small States of the Commonwealth (VUSSC). Thirty countries are now actively engaged in making the VUSSC a reality. VUSSC countries have chosen to focus on creating skills-related courses in areas such as tourism, entrepreneurship, professional development, disaster management and a range of technical and vocational subjects. These non-proprietary, electronically-held course materials [OER], which can readily be adapted to the specific context of each country, are used in the offering of credit-bearing qualifications in the countries’ recognized institutions, strengthening their

⁵ <http://www.tessafrica.net>

⁶ <http://www2.edc.org/mistm/product/default.html>

⁷ <http://www.col.org/vussc>



educational capacity and outreach. Small states thus become active contributors to global development and leaders in educational reform through the innovative use of information and communications technologies (ICTs).’ (VUSSC, 2011).

[African Virtual University](#)⁸

The African Virtual University (AVU) has launched an interactive OER portal called ‘[OER@AVU](#)⁹’. It contains resources developed together with 12 universities in 10 African countries. (AVU, 2011). ‘The AVU has developed 73 modules as follow: 46 Math and Sciences, 4 ICT Basic Skills, 19 Teacher Education professional courses and 4 related to the integration of ICTs in Education and integration in respective subject areas. A decision was made in 2006 to release the 73 modules as Open Education Resources in order to make the developed courses freely available for all.’ (OER@AVU, 2011).

‘The AVU OER Repository will also serve as a platform for educators to use, modify and contribute to AVU collection, make their educational resources available to others, discuss and comment on them, and collaborate in developing them further. It will host all of the AVU’s upcoming open educational resources in areas such as Business Studies, Computer Sciences, Agriculture and Environmental studies. The new AVU OER Repository, OER@AVU, is funded by the African Development Bank.’ (OER@AVU, 2011).

[OER UCT, University of Cape Town \(UCT\)](#)¹⁰

The OER UCT project is run in the Centre for Educational Technology at UCT with the support of the [Shuttleworth Foundation](#)¹¹ and aims to showcase the teaching efforts of UCT academics by encouraging the publication of resources as OER. The collection of open educational resources from the University of Cape Town can be accessed on the [UCT OpenContent directory](#)¹².

[OER Foundation, New Zealand](#)¹³

‘[The Open Education Resource](#) (OER) Foundation is an independent, not-for-profit organisation that provides leadership, international networking and support for educators and educational institutions to achieve their objectives through Open Education.’ (WikiEducator, 2011c).

[WikiEducator, New Zealand](#)¹⁴

The website states that ‘WikiEducator is an evolving community intended for the collaborative: planning of education projects linked with the development of [free content](#)¹⁵; development of free content on [Wikieducator](#) for e-learning; work on building open education resources (OERs) on how to create OERs; networking on [funding proposals](#) developed as free content. WikiEducator is a global community of +18,600 educators working in the formal education sector and hosts the Learning4Content project, which to date has provided free ICT skills training to over 5,200 educators from 140 countries.’ (WikiEducator, 2011)

⁸ <http://www.avu.org/>

⁹ <http://oer.avu.org>

¹⁰ <http://www.cet.uct.ac.za/oer>

¹¹ <http://www.shuttleworthfoundation.org/>

¹² <http://opencontent.uct.ac.za/>

¹³ <http://wikieducator.org/OERF:Home>

¹⁴ http://wikieducator.org/Main_Page

¹⁵ <http://freedomdefined.org/Definition>



[Open Learning Initiative, Carnegie Mellon University](#)¹⁶

The Open Learning Initiative has been supported by [The William and Flora Hewlett Foundation](#). The project is also supported by The Bill and Melinda Gates Foundation, The Lumina Foundation and The Kresge Foundation. It has spurred the creation of [Open & Free Courses](#)¹⁷. The courses are free to take, but learners need to be able to go online to do them; a teacher, for example, may find it complicated to download these materials and present them offline. At Carnegie Mellon University, a Spring 2007 study showed that Open Learning Initiative Statistics students who participated in a hybrid mode (where the course included instructor-led class sessions and student self-paced lessons) learned a full semester's worth of material in half as much time. Furthermore, the students performed as well or better than students learning from traditional instruction over a full semester.

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[MIT OCW](#)¹⁸

The MIT OCW project has [received funding](#)¹⁹ from foundations such as the William and Flora Hewlett Foundation and the Andrew W. Mellon Foundation; from Corporations such as The Ab Initio Corporation and Lenovo; from in-kind contributors such as Google Grants and the United Nations Development Programme and from Individual supporters.

Launched in 2002, OCW is MIT's program to share course materials - including syllabi, lecture notes, assignments and exams - from virtually all of the Institute's classes, 'freely and openly' on the Web. Through the main MIT OpenCourseWare site (<http://ocw.mit.edu>²⁰) and through translation affiliate sites, OCW materials have been accessed by an estimated 50 million individuals from more than 200 countries and territories worldwide. Affiliates have translated more than 600 of OCW's 1,800 courses into languages including Chinese, Spanish, Portuguese, Thai and Persian. More than 200 copies of the site on hard drives have been sent to universities in bandwidth-constrained regions, primarily Sub-Saharan Africa. The OCW site also allows visitors to [download copies](#)²¹ of individual courses.

Copyright license: CC-BY-SA-NC

[OpenCourseWare Consortium](#)²²

'Incorporated as an independent non-profit organization in 2008, the OpenCourseWare Consortium is a community of over 250 universities and associated organizations worldwide committed to advancing OpenCourseWare sharing and its impact on global educational opportunity. The mission of the OpenCourseWare Consortium is to advance formal and informal learning through the worldwide sharing and use of free, open, high-quality education materials organized as courses.' (MITOpenCourseware, 2010b) Collectively, OCW Consortium members have published materials from more than 13,000 courses in 20 languages, available through the Consortium's website.

Activities of the OpenCourseWare Consortium are [supported](#)²³ by the William and Flora Hewlett Foundation, member dues, and contributions from sustaining members.

¹⁶ <http://oli.web.cmu.edu/openlearning/index.php>

¹⁷ <http://oli.web.cmu.edu/openlearning/forstudents/freecourses>

¹⁸ <http://ocw.mit.edu/>

¹⁹ <http://ocw.mit.edu/donate/our-supporters/>

²⁰ <http://ocw.mit.edu/>

²¹ <http://ocw.mit.edu/about/media-coverage/press-releases/50m/>

²² <http://www.ocwconsortium.org/>

²³ <http://ocw.mit.edu/about/ocw-consortium/>



Copyright license: CC-BY

[OpenCourseWare, University of California](#)²⁴, Irvine (member of OCW Consortium)

[Funding](#)²⁵ by the William and Flora Hewlett Foundation allowed for the development of OCW created specifically for targeted audiences such as California public school teachers seeking help in passing state examinations for single-subject science and mathematics credentials. Access to UCI-faculty created undergraduate and graduate courses that are currently being taught to matriculated UCI students, is also offered.

License: CC-BY-SA-NC

[Connexions Project](#)²⁶

The [Connexions Project](#)²⁷ has received [grants](#)²⁸ from the William and Flora Hewlett Foundation, and support from the Maxfield Foundation and the Connexions Consortium.

The materials are in a variety of formats, accessible not only online, but in downloadable PDF and EPUB formats, as well as through a print-on-demand option. Connexions houses one of the largest [repositories](#)²⁹ of open educational resources (OER) in the world, enabling the [creation, sharing, modification](#)³⁰, and vetting of [content](#)³¹ accessible to anyone, anywhere, anytime via the World Wide Web. It has more than 17,000 learning objects or modules in its [repository](#) and over 1000 collections (textbooks, journal articles, etc.) are used by over 2 million people per month.

Copyright license: CC-BY

[Khan Academy](#)³²

‘The mission of the Khan Academy is to provide a world-class education, for free, to anyone in the world. It consists of 1700+ videos on [YouTube](#)³³ covering everything from basic arithmetic to advanced calculus, chemistry and biology, along with a series of exercises that allow students to practice and assess their knowledge at their own pace.’ (Khan Academy, 2011). The short video instruction format and openly licensed material have garnered Khan Academy enormous popularity, with over 70,000 daily video views. Since the site’s inception in late 2006, Khan Academy has received 18 million page views worldwide. Because they are available on YouTube, closed captioning allows translation of the videos into over 40 languages.

²⁴ <http://ocw.uci.edu/>

²⁵ <http://ocw.uci.edu/info/>

²⁶ <http://cnx.org/>

²⁷ <http://cnx.org/aboutus/>

²⁸ <http://cnx.org/sponsors>

²⁹ <http://cnx.org/aboutus/overview/repository>

³⁰ <http://cnx.org/aboutus/overview/editing>

³¹ http://cnx.org/aboutus/overview/content_types

³² <http://www.khanacademy.org/>

³³ http://www.youtube.com/results?search_query=khanacademy&aq=f



CORE³⁴

‘Established in October 2003, China Open Resources for Education (CORE), a non-profit organization, is a consortium of universities that began with 26 IET Educational Foundation member universities and 44 China Radio and TV Universities. CORE has received [approval and support](#)³⁵ for its activities from the China Ministry of Education (MOE).’

‘Twelve CORE Lead Universities were established and in January 2005 and ten Lead Universities were given initial funding for the smooth operation of the program.’

The Lead Universities committed to translate 130 MIT OCW and to teach 170 MIT OCW. CORE has given funds to each Lead University to ensure the smooth operation of the program. CORE is grateful to have many people’s support and help since its establishment in 2003. Those people, including university presidents, business celebrities, university teachers and university student volunteers, have strong belief of openness and sharing and make their own contribution for CORE’s development.’ (China Open Resources for Education, 2010).

License: Not Stated on website (website license is © All Rights Reserved)

Utah State University³⁶

‘Utah State OpenCourseWare (C)SL is a collection of educational material used in our formal campus courses, and seeks to provide people around the world with an opportunity to access high quality learning opportunities.’

Copyright: CC-BY-SA-NC

eduCommons software³⁷

eduCommons software provides free, searchable, access to course materials for educators, students and self-learners around the world to catalyze the growth of communities of learners. eduCommons received funding from William and Flora Hewlett Foundation and support from MIT OCW.

Copyright license: CC-BY

TEMOA OER Portal, Tecnológico de Monterrey³⁸

Temoa, first proposed by Tecnológico de Monterrey, is a private, non-profit academic institution. Temoa was presented at the World Economic Forum (WEF) in Davos, Switzerland, in January of 2007 under the project name "Knowledge Hub (KHUB)" and then accepted at the World Economic Forum (WEF) in Davos, Switzerland, in January of 2008.

‘Temoa provides a [catalog of collections](#)³⁹ of Open Educational Resources (OER) documented through descriptive information cards to facilitate search, evaluation, selection and adoption of resources and learning materials.’

Statistics⁴⁰:

9,185 educational resources

³⁴ <http://www.core.org.cn>

³⁵ <http://www.core.org.cn/a/About-CORE.html>

³⁶ <http://ocw.usu.edu/>

³⁷ <http://educommons.com/>

³⁸ <http://www.temoa.info/>

³⁹ <http://www.temoa.info/node/42118>

⁴⁰ <http://www.temoa.info/node/42101>



5,948 peer-reviewed

4,363 resources used in class lectures

1,020 courses, topics and activities

5,657 members

Copyright license: Any CC license

[OpenLearn, Open University UK](#)⁴¹

OpenLearn gives free access to learning materials from [The Open University](#)⁴².

It was launched in October 2006, following a grant by the William and Flora Hewlett Foundation and accepts individual donations to support its ongoing activities.

In 2010 OpenLearn merged with open2.net, The Open University website that supports BBC broadcasts, giving access to interactive content, such as expert blogs, videos and games. Open University channels can also be found on [YouTube](#)⁴³ and [iTunesU](#)⁴⁴ and can be followed on [Twitter](#)⁴⁵.

License used: CC-BY-SA-NC

[OTTER, University of Leicester](#)⁴⁶

The OTTER (Open, Transferable and Technology-enabled Educational Resources) project enables the production and release of high-quality open educational resources (OER) drawn from teaching materials delivered at the University of Leicester.

The project is funded by [JISC](#)⁴⁷ and the [Higher Education Academy](#)⁴⁸ and enables the development of OER for free access, reuse and repurposing by others under an appropriate open license, in perpetuity.

License: The website is not clear on which license is used.

[JorumOpen](#)⁴⁹

‘Jorum is a [JISC](#)-funded Service in Development in UK Further and Higher Education, to collect and share learning and teaching materials, allowing their reuse and repurposing. This free online repository service forms a key part of the [JISC Information Environment](#), and is intended to become part of the wider landscape of repositories being developed institutionally, locally, regionally or across subject areas. We use intraLibrary for JorumUK and a modified version of DSpace for JorumOpen’ (Jorum, 2011). A separate collection is available only to UK-based institutions.

⁴¹ <http://www.open.ac.uk/openlearn/about-openlearn/about-openlearn>

⁴² <http://www.open.ac.uk/>

⁴³ <http://www.youtube.com/ou>

⁴⁴ <http://www.open.ac.uk/itunes/>

⁴⁵ <http://twitter.com/openuniversity>

⁴⁶ <http://www2.le.ac.uk/departments/beyond-distance-research-alliance/projects/otter>

⁴⁷ <http://www.jisc.ac.uk/>

⁴⁸ <http://www.heacademy.ac.uk/>

⁴⁹ <http://www.jorum.ac.uk/>



Repository search site: <http://search.jorum.ac.uk/>

[The Community College Open Textbooks Collaborative](#)⁵⁰

'This collection of sixteen educational non-profit and for-profit organizations, affiliated with more than 200 colleges, is focused on driving awareness and adoptions of open textbooks to more than 2000 community and other two-year colleges.' 'College Open Textbooks has peer-reviewed more than 100 open textbooks for use in community college courses and identified more than 550: College Open Textbooks has already peer-reviewed several new open textbooks for use in community college courses and identified more than 250 others for consideration.' (College Open Textbooks, 2011). The Community College Open Textbooks Collaborative is funded by The William and Flora Hewlett Foundation.

Turkey: [Turkish OCW Consortium](#)⁵¹

In October 2006, a Turkish OCW Consortium was formed with twenty-four member universities, led by the Turkish Academy of Science. The number in the consortium has since increased to forty-eight (Kursun, Engin; Wilson, Tina; McAndrew, Patrick and Cagiltay, Kursat, 2010).

PhET: [Physics Education and Technology](#)⁵²

Physics Education and Technology (PhET) is a web site that hosts over 100 interactive Physics, Chemistry, and Math simulations. These research-based and user-tested simulations are freely available online or offline as downloadable modules. Simulations are available in over 57 languages and the web site is available in 12 languages.

License used: CC-BY

Funding Organizations

A range of organizations have supported the OER movement one way or another, none greater than the William and Flora Hewlett Foundation. The OER movement owes much of its existence to this Foundation, which continues to be a driving force.

[The William and Flora Hewlett Foundation](#)⁵³

In relation to OER, the website states: 'Increase economic opportunity and civic engagement by educating students to succeed in a changing world through [deeper learning](#)⁵⁴'; and to 'Equalize access to knowledge for teachers and students around the globe through [Open Educational Resources](#)⁵⁵'. (William and Flora Hewlett Foundation 2010). The strategic plan includes a logic diagram that shows how the Foundation plans to leverage OER to 'Equalize access to knowledge for teachers and students around the globe through OER' (William and Flora Hewlett Foundation, 2010).

⁵⁰ <http://collegeopentextbooks.org/about-us/who-are-we.html>

⁵¹ <http://oro.open.ac.uk/21120/>

⁵² <http://phet.colorado.edu/>

⁵³ <http://www.hewlett.org>

⁵⁴ <http://www.hewlett.org/programs/education-program/deeper-learning>

⁵⁵ <http://www.hewlett.org/programs/education-program/open-educational-resources>



OER Infrastructure

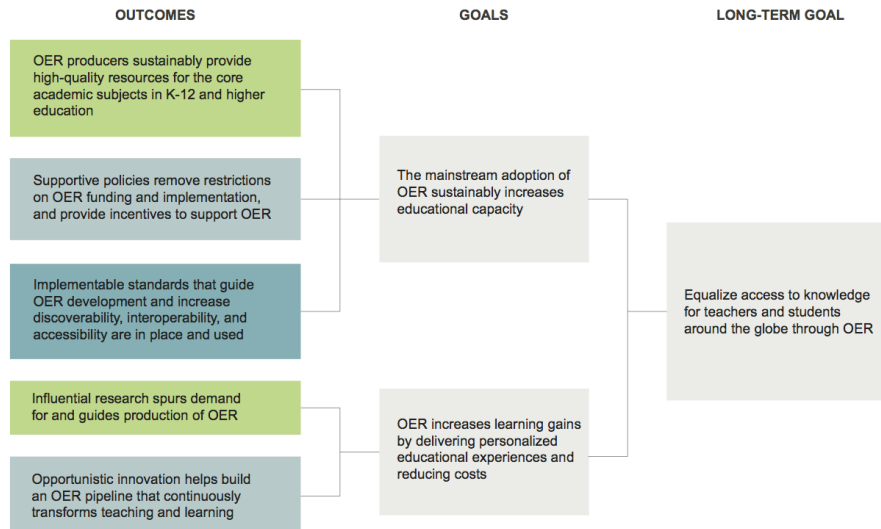


Figure 1: The William and Flora Hewlett Foundation’s logic model on OER (The William and Flora Hewlett Foundation, 2010)

[The Bill & Melinda Gates Foundation](#)⁵⁶

‘Our belief that every life has equal value is at the core of our work at the foundation. We follow [15 guiding principles](#)⁵⁷, which help define [our approach](#)⁵⁸ to our philanthropic work, and employ an outstanding leadership team to direct our strategies and grantmaking.’ (Bill & Melinda Gates Foundation, 2010).

[CK-12 Foundation](#)⁵⁹

‘CK-12 Foundation is a non-profit organization with a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide. Using an open-content, web-based collaborative model termed the “FlexBook,” CK-12 intends to pioneer the generation and distribution of high quality educational content that will serve both as core text as well as provide an adaptive environment for learning.

The content generated by CK-12 and the CK-12 community will serve both as source material for a student's learning and provide an adaptive environment that scaffolds the learner's journey as he or she masters a standards-based body of knowledge, while allowing for passion-based learning.’ (CK-12 Foundation, 2011).

⁵⁶ <http://www.gatesfoundation.org/>

⁵⁷ <http://www.gatesfoundation.org/about/Pages/guiding-principles.aspx>

⁵⁸ <http://www.gatesfoundation.org/about/Pages/our-approach-to-giving.aspx>

⁵⁹ <http://www.ck12.org>



[Open Society Foundations](#)⁶¹

'Priorities for 2010-2011 include expanding the number of pilot countries we are supporting, addressing the need for online search and discovery of OER, movement-building activities, and research on business models and standards for OER which are needed to support further policy initiatives.' (Open Society Foundations, 2011).

[Lumina](#)⁶¹

'Lumina is committed to enrolling and graduating more students from college. Lumina pursues this goal in three ways: by identifying and supporting effective practice, by encouraging effective public policy, and by using our communications and convening capacity to build public will for change.' (Lumina, 2011).

[JISC](#)⁶²

The Joint Information Systems Committee (JISC) offer monetary awards for 'insightful, reflective case studies into the use of open educational resources OER for learning and teaching' (JISC, 2011).

[Saylor Foundation](#)⁶³

The focus of the Saylor Foundation since 2008 has been its Free Education Initiative, through which they aspire to 'make education freely available to all.' Currently the focus is on undergraduate college level, with plans to include primary, secondary and post-graduate courses in future. (Saylor Foundation, 2011).

What's Needed to Advance OER

Repositories and Platforms

Coordination between international and donor agencies can help ensure that funding is applied most efficiently, ideally to create a complete set of peer reviewed educational resources in all subjects and all levels in all major languages.

The emerging global repositories and catalogues of OER need to 'feed off' or link to each other so that learners and educators can look for OER in any one of these sites from one central access point, without the need to visit multiple sites individually. This can be accomplished by the coordination and cooperation between repositories and catalogues, rather than attempting to choose one repository as a global archive.

The global repositories and catalogues that receive funding support from donor agencies should all provide full support for all languages supported by existing computer technologies. Meta-data of all OER should be available in the first instance, in the official languages of the United Nations and then additional languages as funding and skills allow.

Platforms that support the creation and customization of OER will need to create systems that enable the transfer of OER between platforms (and between platforms and repositories). Rather than attempting to get the whole world to adopt one set of standards, focus should be given to ensuring that a range of software applications can be used to suit all styles and budgets across the world, and that completed OER are translatable into other formats. These completed OER should be listed in one or more of the available global repositories and catalogues.

Information about the technologies used by the global platforms, repositories and catalogues should be communicated freely to institutions so that people around the world can connect directly to these systems and share resources dynamically. If institutions share their OER with the global platforms, repositories and catalogues, their resources can be more readily found, customized and shared.

⁶¹ <http://www.luminafoundation.org/>

⁶² <http://www.jisc.ac.uk/fundingopportunities/futurecalls/grant.aspx>

⁶³ <http://www.saylor.org>



International and Funding Agencies

International agencies, multilateral agencies, governments and funding agencies can promote OER by acquainting their staff with OER, its economies of scale and collaboration and the potential OER hold to accelerate education across the globe. Extensive training workshops, both face-to-face, webinars, and other online or offline formats could be used in all regions to share knowledge of OER. Experience and evaluation of the Virtual University for the Small States of the Commonwealth initiative, shows that extended face-to-face training workshops of up to 3-weeks helps to accelerate and solidify the ICT skills of educators and Ministry officials (West, 2009). Where educators already have ICT skills, projects such as the [Learning4Content](http://wikieducator.org/Learning4Content)⁶⁴ training program of WikiEducator has shown that thousands of people can be trained online, with the support of volunteers, through a learning contract (WikiEducator, 2011d).

Funding agencies and governments can consider including requirements in funding packages that pay institutions based more on the success rates of learners (outputs), rather than registrations (inputs).

If OER are to make a substantial impact on the Education For All (EFA) campaign, funding agencies and governments may need to find common ground in methods of providing learning opportunities to young people for whom there are no schools and no teachers. Funding agencies in particular, could make an impact by demonstrating how projects work that involve providing robust, shared computer and Internet terminals and local repositories that provide large volumes of information from the Internet.

To date, funding seems to be a key factor in making OER projects work. Institutions and governments have specific patterns of how they currently spend income and need firm examples to help them to see ways to apply budgets in different ways. The projects funded by the William and Flora Hewlett Foundation are exemplary in showing that other ways are possible than the current way that still leaves some 400 million young people out of secondary education and millions more out of higher education.

The example projects need to show how they can be translated into funding being saved from existing budget line items in governments and institutions and how these amounts can be more productively invested in overall OER strategies. The examples need to show that not only can existing funds be redirected, but that this will lead to better quality, more consistent education (across institutions and countries) and that education opportunities can therefore be expanded to more people who currently do not have these options available to them.

Grant agencies might consider contracts in which institutions give the assurance that projects will, once the revenue models have been shown, be continued after the external funding runs out.

Specific funding objectives to expand the use of OER and to encourage institutions and governments to re-direct funds toward more productive uses include:

The establishment of global curriculum outline guidelines⁶⁵ could support OER by:

- Providing a broad base curriculum outline for all subjects at all levels. This would ensure that when an OER resource is created in one country, that the majority of the resource is usable content in most other countries.
- Encouraging partner institutions to translate and adapt existing materials across, firstly the official languages of the United Nations, and then to other languages as needed by countries.

Free Textbook projects that could be funded include:

- Free or OER Textbook projects, to increase access to educational resources at reduced costs.

⁶⁴ <http://wikieducator.org/Learning4Content>

⁶⁵ For example: 'The Institute for International Medical Education was established in 1999 and has been entrusted with the development of "global minimum essential (core) requirements" to be required by physicians throughout the world'.
<http://www.iime.org/iime.htm>



- Digitized textbooks that can be used by any person with a computer or hand-held device without being forced to print the book. This can help to reduce budgeted funds from being transferred out of the country.
- Digitized textbooks that can be printed locally for people who do not have access to computers or hand-held devices, can provide textbooks locally. This can help to reduce budgeted funds from being transferred out of the country, while supporting local business opportunities (including school or college print-shops).

Online content development platforms, repositories and catalogues could be funded if:

- The projects selected for support shows that they have the technical capacity to work with all languages and alphabets.
- Various technical formats can be uploaded, converted and shared, provided any of the most popular computer applications are used.

To overcome the extreme shortage of schools and institutions of learning, especially in the developing world, but wherever there is a shortage of affordable places for learners, funding could be directed to:

- The establishment of a new form of a very low cost school or institution that can operate with the minimum of formality, with teachers being available to groups via online forums and where learners are able to support each other.
- A simplified method of accrediting open and unconventional schools, colleges, private sector and non-profit institutions that accommodate the out-of-school youth who have no other alternative.

Government Initiatives

Governments and ministries of education could support country goals by improving the ability of tertiary and workforce development programs to produce workforces with relevant skills. Policies and grant programs that include the integration of OER in education at all levels, and the promotion of broad-based, affordable access to the Internet and Information Communication Technologies can enhance the achievement of national educational goals.

The United States of America

The US Government shows striking leadership in its National Education Technology Plan 2010 titled: 'Transforming American Education. Learning Powered by Technology' in which it states that: 'All students and educators will have access to a comprehensive infrastructure for learning when and where they need it.' (U.S. Department of Education, 2010).

Further, the US Government states in their National Broadband Plan⁶⁶ that 'the demands of the new information-based economy require substantial changes to the existing system. American businesses have pointed to a widening gap between the skills of graduates and modern workforce demands. The U.S. Department of Labor⁶⁷ predicts 'occupations that usually require a postsecondary degree or award are expected to account for nearly half of all new jobs from 2008 to 2018.' The 21st century workplace requires both a better-educated and a differently educated work force.' (U.S. Department of Education, 2010).

The Plan goes on to say that 'Broadband can be an important tool to help educators, parents and students meet major challenges in education. The country's economic welfare and long-term success depend on improving learning for all students, and broadband-enabled solutions hold tremendous promise to help reverse patterns of low achievement (U.S. Department of Education, 2010).

With broadband, students and teachers can expand instruction beyond the confines of the physical classroom and traditional school day. Broadband can also provide more customized learning opportunities for students to access high-

⁶⁶ <http://www.broadband.gov/plan/>

⁶⁷ <http://www.ed.gov/technology/netp-2010>



quality, low-cost and personally relevant educational material. And broadband can improve the flow of educational information, allowing teachers, parents and organizations to make better decisions tied to each student's needs and abilities. Improved information flow can also make educational product and service markets more competitive by allowing school districts and other organizations to develop or purchase higher-quality educational products and services.' (U.S. Department of Education, 2010a).

The most industrialized countries of the world have and are improving their online infrastructures, and are using this to upgrade their education systems. Developing countries could benefit from models that will leapfrog old technologies and methods of management, teaching and learning so that they can become more competitive in the industrialized and information economies of the 21st century.

The US Government Open College Textbook Act of 2009 'authorizes the Secretary of Education to award competitive one-year grants to institutions of higher education (IHEs), professors from IHEs, and producers of open textbooks to create or update open textbooks, or adapt textbooks into open formats, for postsecondary coursework.' This 'requires such textbooks to be posted on an easily accessible and interoperable website and made available to the public free of charge.' (U.S. Department of Education, 2010b).

Examples of open schooling have begun to show this as another viable alternative to providing schooling to more young people who would otherwise be unable to enter a school. Since the challenge of education to large numbers of people remain insurmountable, governments may consider allowing unconventional forms of education such as 'institutions without walls', that only provide access to educational resources, using technology. An open examination system would enable those children who achieve success under these conditions to enter the formal educational system where possible.

Netherlands: [The Wikiwijs Project](#)⁶⁸

'Wikiwijs (literally translates into English as 'Wikiwise') is an open, internet-based platform, where teachers can find, download, (further) develop and share educational resources. The whole project is based on open source software, open content and open standards.

The Dutch minister of Education, Ronald Plasterk, announced the Wikiwijs project in December 2008. The reason was a report by the Onderwijsraad: 'Onderwijs en open leermiddelen' (Education and open educational resources). In May 2009, the Ministry of Education commissioned Open Universiteit Nederland and Kennisnet to develop a program plan. The program plan consists of five components:

- Access (an adequate technical infrastructure)
- Content (sufficient supply of educational resources)
- Communities (enthusiastic teachers having sufficient possibilities to connect to one another)
- Proficiency (proficient users who possess the knowledge and skill to deal with developing, arranging and/or using open, digital educational resources)
- Research (well-founded understanding of the results established by Wikiwijs)The scope of Wikiwijs is the whole Dutch educational system: from primary schools up to the universities.' Wikiwijs (2011).

United Kingdom: [The JISC Project](#)⁶⁹

'JISC inspires UK colleges and universities in the innovative use of digital technologies, helping to maintain the UK's position as a global leader in education.' (JISC, 2011) JISC is funded by the UK Higher Education and Further Education funding bodies to provide world-class leadership in the innovative use of ICT to support education and research.


⁶⁸ <http://www.wikiwijs.nl/>

⁶⁹ <http://www.jisc.ac.uk/>



Canada: The BCcampus [Free Learning Project](#)

‘The BCcampus OER Portal is an initiative by [BCcampus](#) to create awareness of the availability of high-quality freely available open educational resources from both British Columbia, Canada and beyond.’ (BCcampus, 2011). BCcampus supports the Canadian province of British Columbia’s public post-secondary institutions.



Removing barriers to OER adoption - Legal and practical implications of OER

Open source standards

One of the debates that can derail or delay OER projects is where a stalemate crops up concerning the file formats that are to be used. Educators and institutions starting out in this area need to understand their options and the associated implications, with knowledge about the two main sides of the debate. Estimates generally show that Microsoft Office is the most widely used office package around the world (Answers.com, 2010). The Open Source community has a strong case about the cost of proprietary software that may be affordable in some parts of our society and not in other parts of society. Rather than laying down a single standard, we should remember that most of the content developing that is text-based, does not need particularly advanced formatting and so converting between [MS Word](#)⁷⁰, [OOo Writer](#)⁷¹, [Apple Pages](#)⁷² and other word processors is very feasible for a team. If a small team is constituted to write text content, it will certainly be easier if that team consistently uses the same word processor, but there is little to worry about technically until the late stages of the project, when page formatting can become an issue if converted from one software package to another.

If the content development teams have reliable access to the Internet, they might also consider using online word processors such as [Live.com](#)⁷³, [Google Docs](#)⁷⁴ and [ThinkFree](#)⁷⁵. These services provide for the online sharing of files for teams with members working in different locations.

Since conversions between word processors is more reliable now, there is little left to argue when consensus cannot be reached on which word processor to use. The choice can be based on cost and personal (team) preferences. Specialists in desktop publishing, media and other specialists, may be much more specific in their needs.

The “not invented here” syndrome

Educators have for some time been paid, based on particular norms. One of these norms is that they prepare their own notes for classes or write distance education lecture notes. When the same educator is now asked to do what many academics might regard as cheating, to download existing content and reuse it, they may feel that they are no longer doing their job. If performance appraisal systems have been built on the basis of creating a certain volume of learning resources, tutoring a specific number of learners, and so on, the appraisal system may be out-of-sync with the new norms. The new norms are: finding existing materials, customizing them to suit the target group of learners and releasing them, knowing that the learners will know that the materials were developed by someone else, possibly in another part of the world and not their own lecturer.

An educator may believe they are the only person in the world that can prepare a particular piece of material and could refuse to contemplate using OER, or may refuse OER on the basis of the quality not meeting their own standard.

Performance appraisal systems will need to be adapted to suit the new way of working with OER.

⁷⁰ <http://office.microsoft.com/en-us/>

⁷¹ <http://www.openoffice.org/>

⁷² <http://www.apple.com/iwork/>

⁷³ <http://www.live.com>

⁷⁴ <http://docs.google.com/>

⁷⁵ <http://www.thinkfree.com>



In some institutions, educators have been able to create learning content on institutional time and still have the benefit of selling the content as prescribed or recommended textbooks. What incentives can now be introduced to encourage such an educator to give up a possible lucrative side-income?

Adoption by ministries of education

Ministries of education wishing to improve the use of funds, might consider the cost of buying textbooks each year from commercial companies. Issues of quality will no doubt be cited, but one should consider who the authors of the textbooks are in the first place. If the authors are employees of national institutions, are their salaries already paid and should their productive time be reapplied to projects to write OER textbooks, which are then released free of charge to the world? If a book is written and released as an OER in a Pacific country, and that content may be 80% suitable in a European country, thereby reducing the time to produce a new work, would this both reduce the time and cost of development and help to bring about more similarities in educational standards around the world?

To make materials developed in different parts of the world more comparable in educational standard, global standards need to be established and adopted. This topic will be covered in more detail later in this report.

Copyright, repositories, ‘online courseware factories’

When an author of a work uploads it to a particular repository or wiki, the work becomes part of that repository’s overall collection. In the case of a catalogue of educational content like the OERCommons, the original author(s) would have to be acknowledged.

If the work is uploaded into a wiki, the username of the person uploading it will be recorded in the history record of the page. Usernames on a wiki may be quite cryptic such as: HappyCamper, Phsi, D yadav or Fgfg (all real user-names on a wiki). The user’s personal page and registration may contain the real-name of the contributor, but provision of that real-world information is voluntary. The email address listed by the user must be functional, but also may not provide clues as to the real identity of the user contributing to the learning materials. Participation in a community such as a wiki requires contributors to put the community first and not their own name and esteem.

The author(s) may record their name(s) on the wiki page containing the learning materials, but this may be deleted in due course as more and more people edit the same page. Some authors may want their name to remain connected to the work as the original creator of the work. Others may be particularly concerned with having their name linked to a work they no longer ‘control’. A range of technologies may therefore be ideal that suit different people’s needs and expectations, rather than expecting all people to conform to one ‘standard’.

OER may carry a range of copyright licenses. A popular set of licenses is provided by [Creative Commons](http://creativecommons.org/)⁷⁶. When works carry these licenses, the user is informed by the license that they may use (or reuse) the work without recourse to the original author or creator of the work. There are a few ‘restrictions’ associated with these licenses that need to be known and understood. When reusing works downloaded from a repository, the Creative Commons license specifically states the following about attribution (the ‘BY’ restriction):

1. ‘. . . You must include a copy of, or the Uniform Resource Identifier (URI). . .’ (Creative Commons, 2011).

This means that the new material must always show good faith about from where the original work was downloaded.

2. ‘You must keep intact all notices that refer to this License and to the disclaimer of warranties with every copy of the Work You Distribute. . .’ (Creative Commons, 2011).

This specifies that the original license of the work incorporated into the new, customized work should state the original copyright notice of the incorporated work. This implies that if the incorporated work is of a different license to the work before and/or after it, the start and end points of the incorporated work must be indicated and the appropriate copyright license shown. This appears to show that a new level of attribution of works is required; whereas

⁷⁶ <http://creativecommons.org/>



we are used to citing references to other works, when working with OER, we need to also attribute the different licenses throughout the works we compile for other existing works.

3. ‘ . . . If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection any credit as required by Section 4(b), as requested. If You create an Adaptation, upon notice from any Licensor You must, to the extent practicable, remove from the Adaptation any credit as required by Section 4(b), as requested.’ (Creative Commons, 2011).

This states that the OER that has been incorporated into a new work should be identifiable and if the user is asked by the original rights holder to remove it, this should be possible. This again shows that it is feasible to combine works with different licenses, provided the start and end points of the incorporated works and the license reflected for that section as part of the regular attribution are shown.

4. ‘ . . . Except as otherwise agreed in writing by the Licensor or as may be otherwise permitted by applicable law, if You Reproduce, Distribute or Publicly Perform the Work either by itself or as part of any Adaptations or Collections, You must not distort, mutilate, modify or take other derogatory action in relation to the Work which would be prejudicial to the Original Author’s honor or reputation’ (Creative Commons, 2011).

For rights holders or authors who are concerned about what other people will do with their work, here is the answer in the Creative Commons legal code: No one is allowed to ‘distort, mutilate, modify or take other derogatory action’ with regard to the OER. If they do, the rights holder could take legal action. The rights holder may simply choose to post a note of disgust on the repository or wiki where his or her work has been distorted, or post a note on their own website or repository, distancing themselves from the customized work they feel is derogatory to themselves.

Taking the above into account, it seems that when downloading a work from a repository like OERCommons, one would reference the work that is being downloaded. However, when downloading a work from a Wiki, which is authored by any number of people and where the authors may only be identified by their screen names and not necessarily real names, the wiki is to be referenced. This could affect choices made by both individuals who are protective over the works they personally create and are willing to share, and institutions that share works and want their name to remain visible in all copies.

Further information has been included in the Appendix to this report on the citation of educational works that carry a [mix of Creative Commons licenses](#).

Curriculum Outlines

An area that appears to have received relatively little attention is the agreement of globally recommended curriculum outlines. There is a risk of having multiple organizations create similar OER, based on curriculum guidelines that cover the same topic areas, but end up varying sufficiently to restrict their transferability between countries. There are a few examples where standardized curriculum outlines do exist.

Much as institutions might in future expect educators to first check for the availability of OER before creating new learning resources from scratch, institutions should expect educators to first check for internationally recognized curriculum outlines before embarking on the creation of new learning resources.

In the USA, the ‘[Common Core State Standards Initiative](#)⁷⁷’ is a U.S. education initiative that follows the principles of [standards-based education reform](#)⁷⁸. The initiative is sponsored by the [National Governors Association](#)⁷⁹ (NGA) and the [Council of Chief State School Officers](#)⁸⁰ (CCSSO). Announced on June 1, 2009, the initiative’s stated purpose is to

⁷⁷ http://en.wikipedia.org/wiki/Common_Core_State_Standards_Initiative

⁷⁸ http://en.wikipedia.org/wiki/Standards-based_education_reform

⁷⁹ http://en.wikipedia.org/wiki/National_Governors_Association

⁸⁰ http://en.wikipedia.org/wiki/Council_of_Chief_State_School_Officers



“provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them.”

The Australian Government is working on a joint project with its states and territories to develop an [Australian curriculum](#)⁸¹.

The province of British Columbia in Canada have a project to provide [Curriculum Packages by Grade](#)⁸².

The United Kingdom has a [National Curriculum](#)⁸³ divided into primary and secondary education, with guidance and tools to help schools design a curriculum that inspires and challenges all their learners (National Curriculum, 2011).

The [Institute for International Medical Education](#)⁸⁴ is responsible for the development of "global minimum essential (core) requirements" to be required by physicians throughout the world'. (IIME, 2011)

As seen above, there are examples of non-prescriptive ways to provide a basic standard that can help developers of content to produce OER that are imminently transferable to other countries and contexts. These do not have to evolve into rigid or imposing standards, but rather remain as broad guidelines. Broad guidelines are likely to help if it supports the sharing of resources covered in the learning content, the technical formats in which the resources are made available (e.g. ODT, DOC, RTF, XML), the copyright licensing used (e.g. a Creative Commons license) and issues that affect the size of the file and its transmission through the Internet.

⁸¹ <http://www.curriculumsupport.education.nsw.gov.au/home/national.htm>

⁸² <http://www.bced.gov.bc.ca/irp/gc.php?lang=en>

⁸³ <http://curriculum.qcda.gov.uk>

⁸⁴ <http://www.iime.org/iime.htm>



Current Challenges

Search and Discovery of OER

OER are only useful if educators can find them. There are a few places on the Internet where educators can now find OER, although these are still different in many ways, and no single search engine is still able to find resources from all of the sites. This is expanded on in the appendix of this report mainly under the headings of ‘Learning Content Repositories’ and ‘How to find OER’. The area of tagging and finding OER, irrespective of where they are hosted on the Internet, remains a challenge

Interoperability

Issues of interoperability are covered more in the appendix to this report. Interoperability issues can seem to sometimes create a rift between people, depending of what kind of software they happen to use and what philosophy of freedom they have adopted. If inclusiveness and acceptance of difference between people is to be practiced, the OER movement will need to find more efficient methods to share OER of different formats, without prescribing the formats to educators. Why should an educator be required to change from their favorite computer program to satisfy a requirement of a particular platform? When a user uploads a document to a sharing platform such as [Scribd](#)⁸⁵, a range of formats may be uploaded and Scribd makes the changes it needs to accommodate the new content. Scribd also allows users to download the documents in a range of formats, depending on the options selected by the uploading user. Something Scribd does not do is to provide any tools to re-mix multiple pieces of content and then download the final result.

Issues of compatibility have improved dramatically over the last 10 years. The often cited difference between OpenOffice Writer and Microsoft Word has been improved upon by both programs having converters built-in to convert from the other format. The next step is most likely to be for platforms (such as Scribd) to improve their online tools to be able to seamlessly convert between formats and to enable users to copy and paste sections from any document into one document, while building a bibliography that includes details of the copyright licensing of each section that has been included.

Quality Supply

The quality of learning materials, once online, is for everyone to see. Some platforms in the eCommerce sector, enable users to rate content or to rate the providers of content. If institutions have sufficient confidence in their learning content that is placed online, any user could see what other educators had to say about the materials and add comments from their own experience. In the spirit of OER, they could also improve the content directly. When future platforms are established that focus on the sharing of content from multiple sources, a form of rating scheme may need to be introduced. This could be a combination of an individual rating scheme, an institutional rating scheme and a way for formal accrediting agencies to rate content.

The Open Education Quality Initiative (OPAL) is trying to address quality issues in OER by helping to ‘boost the use and acceptance of OER in Europe and beyond, by establishing a European Quality environment for individuals, organisations and policy makers, helping them to define, identify and develop quality for OERs.’ (OPAL, 2011).

Language Considerations

The original OER were created in English, due to the location of the main funding agency in California in the USA. The practice of funding English-language OER has been widened to include Spanish and Chinese OER through partner institutions in the US, Mexico, China and elsewhere. The Internet at one point contained a majority of English-language web-pages but that too has changed. Websites in multiple languages have proliferated and along with them, the need to be able to translate on-the-fly.

⁸⁵ <http://www.scribd.com/>



It is clear that technologies that support OER need to support multiple languages and alphabets or scripts. As a starting point for the next phase of development of the OER movement, systems will need to automatically accommodate the languages with the largest user-base in the world. Using the UN official languages⁸⁶, these would be:

- English,
- French,
- Spanish,
- Chinese,
- Russian and
- Arabic

(UN, 2011).

Provided platforms are able to perform adequately with these languages and alphabets or scripts, other languages could be added, provided countries and communities believe the languages should be included and funding sources are available to support the creation and translation needed.

Sustainability - Emerging Business Models

Publishers

In some cases, publishers may be able to benefit from free texts that are published on the Internet by charging for publishing the print versions of these as books. In other cases, publishers may contract out their expertise in helping to produce finished texts for free distribution via the Internet where the upfront costs can be covered, for example by governments, funders or institutions. The traditional print market for these books may still remain the domain of the publisher.

We expect there will be markets for the traditional publishing models for many decades to come, but publishers will continue to face the challenge of maintaining pace with developments. An example of a publisher that has come up with new models of publishing is [Flatworld Knowledge](http://www.flatworldknowledge.com/)⁸⁷. This publisher is making many of its texts available free of charge in digital format and only charge for print editions. Educators and learners who download digitized books can opt to print the books locally either in their entirety, or in parts if they wish. Other subscription models also exist to increase the options available to authors and users of materials (Marketwire, 2010).

Institutions

Where institutions still consider their printed or other learning materials to be their primary business, consideration should be given to evaluating the value of learner support, assessment and accreditation. MIT and the UKOU have shown that giving away their learning content has increased the demand for their services. Learners can acquire much of the learning content online already, so there is less motivation than in the past to consider 'study packages' to be the principle product being sold by institutions.

As previously mentioned, unconventional institutions such as 'the [University of the People](http://www.uopeople.org/)⁸⁸' (UoPeople) is a tuition free, non-profit, online academic institution headquartered in Pasadena, California, founded by entrepreneur [Shai Reshef](http://en.wikipedia.org/wiki/Shai_Reshef)⁸⁹. The organization is devoted to providing universal access to equality, online post-secondary education to

⁸⁶ <http://www.un.org/depts/dhl/sflib/libmgnt/starters/langdoc.htm>

⁸⁷ <http://www.flatworldknowledge.com/>

⁸⁸ <http://www.uopeople.org/>

⁸⁹ http://en.wikipedia.org/wiki/Shai_Reshef



qualified students, despite geographic or financial limitations. UoPeople's pedagogical model draws on the principles of e-learning and social networking, coupled with open-source technology and open educational resources.' (Wikipedia, the free encyclopedia, 2011a). The costs of running such institutions are being radically reduced through the use of OER and overheads covered through sponsorships and the use of volunteers. Institutions like UoPeople along with sites like WikiEducator and Wikiversity could establish for-profit or non-profit, global institutions once they have a broad enough body of educational resources and the recognition of at least one formal accreditation system.

'[The Virtual University for the Small States of the Commonwealth](#)^{90 91} (VUSSC) is an initiative that was created by the Ministers of Education of small states.' (West, 2009). This initiative is not an institution in conventional terms, but up to now has provided capacity building in the development of OER for 32 of the smallest states in the world. The initiative has created a Transnational Qualifications Framework (TQF) to form a basis on which these small states can exchange educational resources and qualifications. Any of the nationally recognized institutions in these small states may in consultation with the VUSSC management committee and the TQF, begin to offer programs internationally under the banner of VUSSC. By doing this, institutions in the smallest of countries could offer programs that carry accreditation in multiple countries (West, 2009).

The [Windows to the Universe](#)⁹² site provides free content related to Earth and Space Sciences, with Google Adwords as a source of income. Windows to the Universe currently offers two types of membership. At US\$9.99 per year a Regular Member enjoys certain benefits, such as discount in the online store, access to updated calendars and a journal tool. At US\$20 per year, educators and teachers can become Educator Members, which will in future provide benefits such as free access to webinars and the ability to download pdfs for classroom activities. Other membership formats are currently being considered. Both membership options give access to an advertisement-free version of the website (Windows to the Universe, 2011).

The [WikiEducator](#)⁹³ website mentioned earlier in this report, reports that it has over 18,000 registered users who have collectively produced more than 16,000 articles or pieces of learning content. This site is supported by donors, including its users.

⁹⁰ <http://www.col.org/vussc>

⁹¹ <http://www.vussc.info/>

⁹² <http://www.windows2universe.org/>

⁹³ <http://wikieducator.org/>



Who could benefit from OER?

Learners

Learners who want to participate in lifelong learning may benefit from increasing their awareness of the potential of OER both for accessing lifelong learning resources free of charge and for supplementing formal education programs. Learners who benefit from OER and are interested in its proliferation may consider becoming advocates for OER at community and institutional level.

The Internet provides a wealth of community resources to support learners who want to learn. Learners would benefit if they seek out, join and participate in the communities appropriate to their field of study and interest.

Information Specialists

Information specialists, including librarians and knowledge workers, need to provide support for OER in a similar way in which they do so for journals, textbooks and online information, both for learners and educators.

Educators

Educators who are keen to explore ways to improve teaching and learning may benefit from considering the use of OER and its potential savings in effort, time and money. The optimal use of OER by educators depends on the ability of educators to quickly find quality OER that are relevant to the programs they facilitate, which they can then adapt and present to learners.

The use and adaptation of OER brings with it its own array of copyright implications. It is therefore advisable for educators to be familiar with the Creative Commons licenses and its legal implications.

Educators who are unable to interact with OER due to their own need for capacity building in Internet search, word processing or other skills, could consider addressing these through professional development and lifelong learning. Many free courses are available online for educators who have access to computers and bandwidth.

Educators are cautioned to be familiar with the terms of contracts they sign in relation to the use and creation of OER. A contract may be signed by the simple click of a checkbox or a mouse click and the terms are irrevocable.

The more learning content educators share with the world that helps to cover all curriculum at all levels, the better the chance of all teachers being able to offer better education (if they have the necessary minimum equipment and bandwidth). In the same vein that learners are encouraged to actively participate and share in the learning process, educators are also encouraged to actively participate and share in the creation of learning resources and especially OER.

Institutions

The successes of the Education for All campaign at the primary level is helping large numbers of learners to complete primary school and look for places in secondary schools (Daniel, 2010). As previously mentioned, hundreds of millions of young people have found there are no places available to them in schools. Many learners who complete secondary schooling cannot find places within the national or private sector systems of higher education. Institutions that have an interest in resolving the need for additional places for learners in secondary and higher education could increase their impact by finding productive ways to ensure that learners and educators have the access to equipment and bandwidth needed to learn.

If institutions were to install the necessary information technology equipment, it will enable learners, educators and administrators to have easy and affordable access to computer equipment and the Internet. Initial installation costs may be offset in some cases through grants or sponsorships, but institutions need to build in financial models of sustainability to support ongoing training of technical staff, educators, learners, administrators and the community. The replacement and maintenance of equipment and payment of bandwidth are crucial to the provision of education.



Access to schooling, quality education and increasing literacy rates all have a positive impact on economic and social development. This includes increased individual earnings, increased economic growth and a reduction in poverty, crime and conflict. These outcomes could serve as incentives for institutions to be involved in community outreach projects aimed at uplifting community members who have benefitted from fewer opportunities in life. Community outreach projects in areas that do not have Internet access and also have a lack of teachers, can be implemented by combining OER with technologies such as the Digital Doorway⁹⁴ and eGranary⁹⁵, to deliver large quantities of learning content.

Institutional management should guard against treating OER projects as a way to ‘tap into’ funds that grant agencies make available, only to cancel the project once the external funding runs out.

Publishers

The movement toward free textbooks may have been slowed by arguments of quality control, but the success of Wikipedia already shows that community-based models can have peer quality review processes built in.

Publishers should consider ways that they could benefit from free textbook business models as shown by Flatworld⁹⁶ knowledge and other publishers, where the digitized text is available for free download, but the printed book is available in the conventional manner at a cost.

Ministries of education

If Governments take global leadership by investing taxpayers’ funds in free textbook projects, rather than supporting for-profit projects, a wealth of learning materials from around the world could be accumulated very quickly.

If ministries of education were to agree to follow internationally recognized curriculum guidelines as far as practically possible, it will make OER more transferable, leaving only localization to be performed by educators. Where localized versions of OER are shared via the Internet, it should preferably be via the same repository from which the original was received, enabling other countries to benefit from the enriched resources.

According to Barbara Chow, Director, Education Program of The William and Flora Hewlett Foundation, there are several ways governments could use OER to help achieve their education goals:

‘Government Support Strategy 1: Facilitate sustainable implementation

Governments can facilitate sustainable implementation of OER by creating incentives for development and re-use, removing barriers to OER adoption, and funding infrastructure to increase access to OER.

One way to create incentives for OER development and re-use is to embed openness as an expectation within funding programs. There are several examples around the world where governments have done so. The United States Department of Education now includes OER as a specific “invitational grant priority” under its competitive grant programs in its 2010 Notice of Proposed Priorities for Discretionary Grant Programs. The Netherlands’ Wikiwise and New Zealand’s national OER initiative are both publicly funded, as are several Joint Information Systems Committee OER-related programs in the United Kingdom.

Other incentives can help encourage the development and use of OER as well. The BC Campus program in British Columbia, for example, gives funding preference to OERs developed through multi-institutional partnerships, for credentials and credit-based courses, and to projects that incorporate existing OER, incentivizing re-use.

⁹⁴ <http://www.digitaldoorway.org.za/>

⁹⁵ <http://www.widernet.org/egranary/>

⁹⁶ <http://www.flatworldknowledge.com/>



Sustainable implementation also requires the removal of barriers to OER, such as legislation that restrict purchase and use of OER within school systems. In the United States, the state of Georgia required that the state restrict instructional materials purchases to textbooks on a several year cycle (e.g., every 6 years). By locking the content approved for use over that time period and requiring that content to be captured in a physical, proprietary book, OERs have been obstructed from any but the most modest role. Recently, however, Georgia changed its law to allow for the investment in digital and open content in addition to textbooks. By explicitly allowing the use of digital content, the state is now in a position to make direct investments in OER and ensure that students and teachers have the technology to access it...

Finally, a framework for sustainable implementation requires a good information and communication technology (ICT) infrastructure. Unfortunately, to increase access it is not enough to create a vast supply of OER, make it available online, and expect it to reach the thousands of people who could use it on its own - government support is necessary for OER to get to scale. In order to access OER, there must be sufficient infrastructure such as power, Internet access, and computer centers. While foundations and private sector donors can fund OER development projects, very few can fund infrastructure projects, which are necessary to fully take advantage of OER.

Government Support Strategy 2: Encourage openness as a component of public policy

Policymakers can also integrate openness as a component of public policy by requiring all publicly funded materials to carry a public license, publishing educational research through open access journals, making more data publicly available and supporting and using open source software.

Open Educational Resources as a concept fits within larger context of openness, which public funders can embrace as a higher overarching policy framework. As noted previously, policymakers can take a major step toward openness by requiring all publicly funded materials to carry a public license. For example, all grantees of British Columbia's Online Program Development Fund must choose a shareable open license, either Creative Commons or one that allows sharing within the province. Another step toward openness includes publishing of educational research through open access journals, thereby increasing access to important research data. Furthermore, policymakers can also encourage openness by making more data public. By releasing government resources and other resources created under government contract, other resources that benefit the public can be developed. There are several countries joining this particular effort around the world. Open data encourages greater transparency, sharing of data that have social and commercial value, and supports more active citizen participation. Finally, support of open source software enables greater innovation and integration of projects.' (Chow, 2010).

Governments wishing to overcome the remaining backlog in Education For All at all levels, may consider open and unconventional forms of education. This includes the registration of open schools, open universities and 'institutions without walls'.

Inter-governmental, international agencies and funding agencies (multilateral agencies)

Multilateral agencies hold influential positions, which make them suited to **taking the lead** in obtaining consensus on and establishment of broad global curriculum outlines for all subjects at all levels. If these are published with open licenses, it will make it accessible for all countries and enable countries to voluntarily follow it.

OER concepts will only be widely used in education systems' plans and proposals, if specialist staff of multilateral agencies in all fields are familiar with the concept and availability of OER. Regional training workshops will ensure that a thorough understanding of the OER concept is imbedded in the organization and that the important details and issues surrounding OER are known.

In every activity entailing the creation of resources, it would be prudent if a scan for existing OER is conducted prior to starting development of content from scratch. Only where existing appropriate OER cannot be found, should new resources be created; alternatively, the best available OER should be used as a starting point to reduce development time and cost.



Where the creation or customization of educational resources are undertaken, an open copyright license should be insisted upon and only in particular exceptions, alternatives to this be accepted. A policy decision needs to be taken by each multilateral agency on which licenses will be used and why different licenses may be applied under specific circumstances. The ‘most free’ license should always be adopted depending on circumstances.

When funded projects are conceptualized to create, translate or adapt OER, efforts should be made to include multiple institutions from industrialized and developing countries. Careful note should be taken to ensure the creation of equal partnerships and to counter the possibility of unequal or ‘paternalistic relationships’ between countries, institutions or educators.

International and donor agencies should put extra effort toward the support of global platforms that enable the creation, translation, adaptation and sharing of OER. The platforms should be able to cope technically with the demands of international education and law; that multiple technical formats can be uploaded, converted and provided; and that the systems are simple to use for educators with basic word processing skills.

OER catalogues such as the [OERCommons](http://www.oercommons.org/)⁹⁷ show particular promise for making available to educators and learners, OER in multiple formats, languages and copyright licenses. Where multiple platforms such as this exist, interoperability between these platforms should become a further objective. An internationally recognized cataloguing system needs to be applied and if necessary, conversions between major non-compliant systems with this system be created.

Business models that support the sharing of OER in financially sustainable ways, such as that of the publisher, Flatworld Knowledge⁹⁸, should be supported and knowledge of these business models included in capacity building workshops for staff and partners.

In support of the [Paris Declaration and Accra Agenda for Action](#)⁹⁹ international and donor agencies could host global and regional donor coordination workshops aimed at eliminating duplication of effort, while increasing the potential for projects with merit to be supported financially.

In order to strengthen the effectiveness of projects, international and donor agencies should plan monitoring and evaluation (M&E) into project implementation from the start of any new initiative. M&E is a built-in process from the onset of a project and not merely an after-thought. M&E needs to be a constructive and positive process with M&E specialists being fully part of the process and co-responsible for outcomes and impact (not necessarily outputs). International and donor agencies need to ensure they have a member of their own staff directly involved in M&E in projects that they fund.

It is necessary for international and donor agencies to have the tenacity to support programs and initiatives for long enough to help ensure sustainability. Short term funding (e.g. 3 to 5 years) is often not sufficient for a large-scale program to show sustainability. Agencies need to focus on the 5 to 10 year planning horizon and ‘stick with it’.

Development Agencies and project management companies (‘technical agencies’)

Technical agencies that focus on the implementation of initiatives, programs and projects should take into account the potential of finding and customizing OER to add efficiencies to project deployment. A specific motivation should be included in project reports if new resources have had to be created from scratch rather than customized from existing resources.

⁹⁷ <http://www.oercommons.org/>

⁹⁸ <http://www.flatworldknowledge.com/>

⁹⁹ <http://hdrnet.org/522/>



When educational resources are created as a part of any project, the complete set of resources should be made publicly available via one of the global repositories, such as the [OERCommons](http://www.oercommons.org/)¹⁰⁰, to help make other funded projects more efficient. Where this is not possible, specific motivation should be published in the project reports.

In order to strengthen the effectiveness of projects, agencies should plan monitoring and evaluation (M&E) into project implementation from the start of any new initiative. M&E is to be a built-in process and not merely an after-thought. M&E needs to be a constructive and positive process with M&E specialists being fully part of the process and co-responsible for outcomes and impact (not necessarily outputs).

¹⁰⁰ <http://www.oercommons.org/>



Recommendations

The OER movement to date, has grown organically and through the stimulation of funding agencies, most notably the William and Flora Hewlett Foundation. The movement still comprises a range of individual projects and the most visible form of coordination and cohesion is the annual Hewlett Foundation grantees' meeting at which specific issues are discussed and a selection of projects are showcased.

Elements the movement appear to be missing is a large-scale understanding and following amongst the multilateral organizations such as the UN Agencies (with the exception of UNESCO) and the national funding agencies. To help to bridge the missing information in the multilateral agencies, a process of orientation workshops is proposed that will be hosted regionally, in a major city in each of these regions:

- Africa
- East Asia And Pacific
- Europe And Central Asia
- Latin America & Caribbean
- Middle East & North Africa
- South Asia

Orientation of staff in multilateral and other organizations (2-year horizon)

The overall purpose of the orientation workshops will be to provide a broad understanding of the background and potential of OER, a series of orientation workshops will be hosted in each region. These will follow a broad outline agenda, but will aim to provide participants with a background on:

- The concepts and strengths of OER;
- Creative Commons licenses to make sharing of educational content possible;
- How the quality of global education can be improved through OER;
- The issues around the skills and infrastructure required for sharing of OER, with a focus on 'what works' and 'how to';
- How the policy environment in institutions, countries and multilateral organizations must exploit the power of OER.

This agenda will require a series of intensive orientation workshops conducted in each region. The convening organization will need to invite all key organizations to send two representatives who are able to participate fully. The representatives will become the organizations' ongoing focal point for OER. A broad workshop outline for this workshop series is included in Appendix 1.

Setting the International scene (5 to 10-year horizons)

A second phase will be needed to convert the raised awareness and interest into pragmatic funding of existing and new projects. This phase will need to be adopted by a global organization that has both the interest and the core funding to take this forward at the desired scale. The details of this will need to be set out so that all global and regional stakeholders have the opportunity to fully participate in further awareness and capacity building of staff both in the multinational agencies and in institutions and governments.

A typical, top-level agenda should at least include the following:

- Motivating funding to create base OER for all remaining topic areas not already covered by existing and past projects;



- Motivating funding to establish global guidelines for curriculum outlines in all subjects areas, beginning with those that are taught most in secondary and higher education;
- Set up of a global monitoring system to ensure that all topic areas get the appropriate attention;
- Identification of the range of platforms to be used in different parts of the world (based on factors such as home language of the platform) and motivating funding to ensure that the platforms are developed timely;
- Research the existing world inventory of OER, in all languages and for all subjects and levels;
- Orchestrate the creation of all remaining components of OER to be available to all citizens through multiple channels.

A matrix structure will need to be formed of at least three groups of organizations or people, including those who focus primarily but not exclusively on:

- Educational content to be created;
- Technical platforms and how they are to interact with each other across standards, languages and metadata;
- Agencies willing to fund programs, projects and activities.

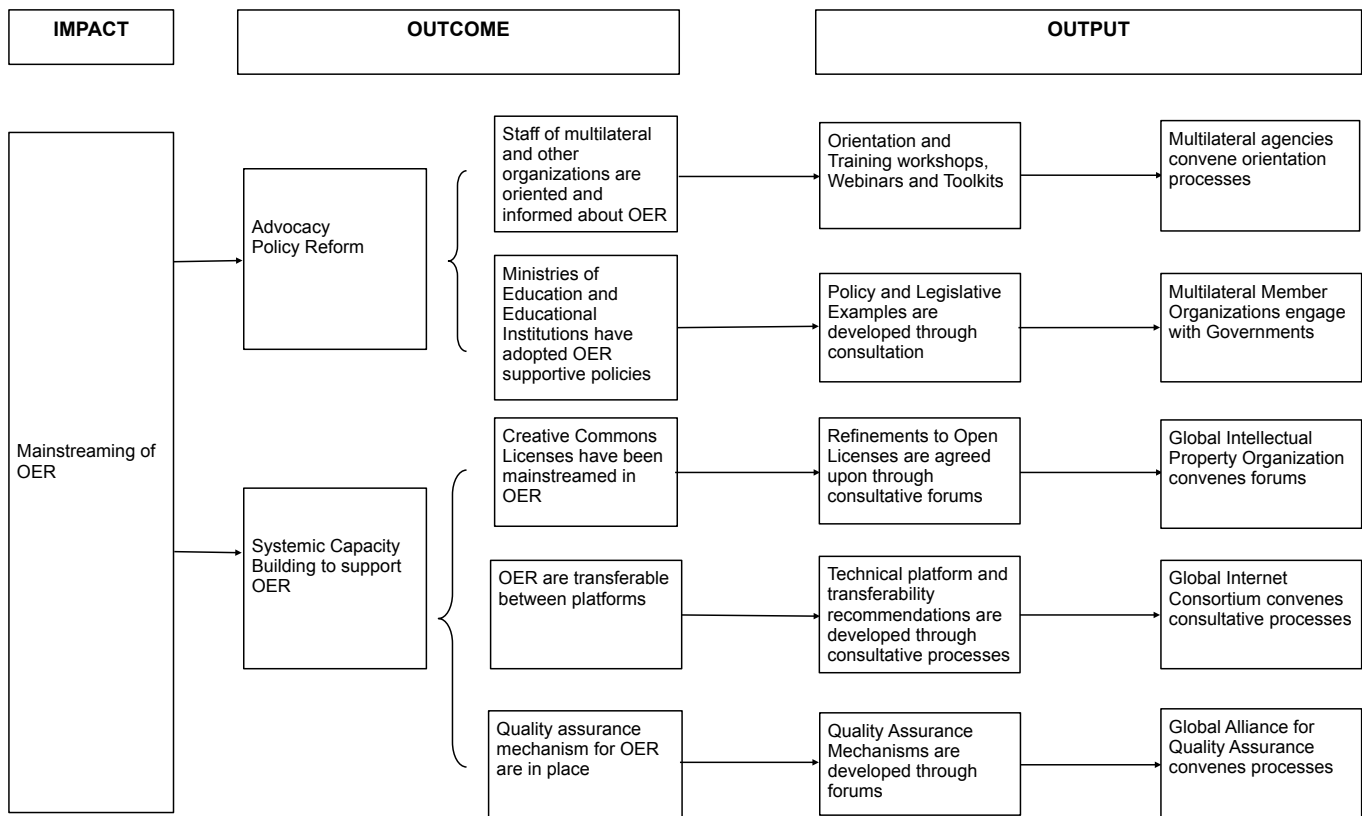


Diagram 1: Mainstreaming OER Globally



Appendices

History of OER

Much has been written on the evolution of the terms used and how these lead up to the coining of the term ‘Open Educational Resources’ or ‘OER’. The following description was presented to a closed expert meeting of the OECD by David Wiley in 2006:

‘In 1994 Wayne Hodgins coined the term “learning object,” and this term quickly entered the vernacular of educators and instructional designers. One role of learning objects in the history of OER is its popularization of the idea that digital materials can be designed and produced in such a manner as to be reused easily in a variety of pedagogical situations. Along with its emphasis on reuse, the learning object movement spawned several standards efforts aimed at detailing metadata, content exchange, and other standards necessary for users to find and reuse digital educational content (ARIADNE, IMS, IEEE LTSC / LOM, SCORM, &c.).

In 1998 David Wiley coined the term “open content,” and while targeted at the educational community (and learning object creators specifically), the term quickly entered the vernacular of internet users. One role of open content in the history of OER is its popularization of the idea that the principles of the open source / free software movements can be productively applied to content, and the creation of the first widely adopted open license for content (the Open Publication License).

In 2001 Larry Lessig and others founded the Creative Commons and released a flexible set of licenses that were both a vast improvement on the Open Publication License’s confusing license option structure and significantly stronger legal documents. One role of Creative Commons in the history of OER is the increase in credibility and confidence their legally superior, much easier to use licenses brought to the open content community.

Also in 2001 MIT announced its OpenCourseWare initiative to publish nearly every university course for free public access for noncommercial use. MIT OpenCourseWare has played many roles in the history of OER, including being an example of commitment at an institutional level, working actively to encourage similar projects, and lending the MIT brand to the movement.

Finally, in 2002 UNESCO held a Forum comprised of some of the many people who “wish[ed] to develop together a universal educational resource available for the whole of humanity.” They chose the term “open educational resource” to describe their efforts: Open Educational Resources are defined as “technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes.” They are typically made freely available over the Web or the Internet. Their principal use is by teachers and educational institutions support course development, but they can also be used directly by students. Open Educational Resources include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabi, curricula and teachers’ guides.’ (Wiley, 2006).

Definitions of OER

The term “Open Educational Resources” has been used worldwide by a range of organizations and interest groups over the last 10 years. As stakeholders have joined in the OER movement, definitions and nuances have begun to surface, due to the different approaches and interests of the various groups. There is no one central “owner” of the term and so it now has meanings that to one specific stakeholder group can be different from the meaning ascribed by another stakeholder group.

Firstly, we include below a summary of some of the most prevalent definitions that have emerged, and then we will indicate some of the implications of the differences and how these might affect the continued expansion of the use of the term OER.



UNESCO, 2002

The term appears to have been first used in a discussion meeting sponsored by the William and Flora Hewlett Foundation held at [UNESCO](#)¹⁰¹ in 2002. The term was defined in the meeting as:

‘Referring to digitized materials, offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research. Open Educational Resources (OER) include:

- Learning Content: Full courses, courseware, content modules, learning objects, collections and journals.
- Tools: Software to support the development, use, re-use and delivery of learning content including searching and organization of content, content and learning management systems, content development tools, and online learning communities.
- Implementation Resources: Intellectual property licenses to promote open publishing of materials, design principles of best practice, and localization of content.’ (The William and Flora Hewlett Foundation, 2005), (Organisation for Economic Cooperation and Development, 2007).

The William and Flora Hewlett Foundation

The description of Open Educational Resources (OER) on [The William and Flora Hewlett Foundation](#)¹⁰² website, is as follows:

‘OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.’ (Atkins, Brown and Hammond, 2007).

[Review of the OER Movement](#)¹⁰³, a report commissioned by the Hewlett Foundation recommended the following definition for OER:

‘OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.’ (Atkins, et al, 2007).

The Open University’s OpenLearn Initiative

The [Open University](#)¹⁰⁴ of the UK has published thousands of courses free of charge on the Internet. In a study conducted by them in 2008, they refer to both Open Content and Open Educational Resources:

‘Open Content vs Open Educational Resources

[OpenLearn](#)¹⁰⁵ was proposed originally under the title the ‘Open Content Initiative’ reflecting the idea that our aims were about what could be achieved by opening up OU content beyond providing the resources as packages to take-away. Over time the term Open Educational Resources and the abbreviation OER has become more established, especially across the community of those who work and research the way in which educational institutions are

¹⁰¹ <http://www.unesco.org/new/en/unesco/>

¹⁰² <http://www.hewlett.org/>

¹⁰³ http://www.oerdeserves.org/wp-content/uploads/2007/03/a-review-of-the-open-educational-resources-oer-movement_final.pdf

¹⁰⁴ <http://www.open.ac.uk/>

¹⁰⁵ <http://openlearn.open.ac.uk/>



providing free access for learners. At the same time open content has tended to be seen as a larger term that goes beyond the educational field in which we work. Neither term is instantly understood by users, and one of our findings is that it is surprisingly tricky to communicate that we are really providing free resources. In this document we use open content and OER interchangeably, with OER implying both the plural Open Educational Resources, and the singular Open Educational Resource.’ (The Open University, UK, 2008).

Wikipedia

[Wikipedia](#)¹⁰⁶ is a source that many people know well. At the time of review, the site stated:

‘Open educational resources (OER) are understood to be "digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research." [1] Open educational resources include:

Learning content: full courses, course materials, content modules, learning objects, collections, and journals.

Tools: software to support the creation, delivery, use and improvement of open learning content including searching and organization of content, content and learning management systems, content development tools, and on-line learning communities.

Implementation resources: intellectual property licenses to promote open publishing of materials, design-principles, and localization of content.’ (Wikipedia, the free Encyclopedia, 2010).

The Open eLearning Content Observatory Services project (OLCOS)

One report, the [OLCOS Roadmap 2012](#)¹⁰⁷, notes that there is no established definition of OER and prefers to identify three core attributes:

- ‘that access to open content (including metadata) is provided free of charge for educational institutions, content services, and the end-users such as teachers, students and lifelong learners;
- that the content is liberally licensed for re-use in educational activities, favourably free from restrictions to modify, combine and repurpose the content; consequently, that the content should ideally be designed for easy re-use in that open content standards and formats are being employed;
- that for educational systems/tools software is used for which the source code is available (i.e. Open Source software) and that there are open Application Programming Interfaces (open APIs) and authorisations to re-use Web-based services as well as resources (e.g. for educational content RSS feeds).’ (Geser, 2007).

OER Africa

[OER Africa](#)¹⁰⁸, a non-profit organization hosted in Kenya and South Africa, suggests the following as a definition for OER:

‘In brief, the concept of OER describes educational resources that are freely available for use by educators and learners, without an accompanying need to pay royalties or license fees. A broad spectrum of frameworks is emerging to govern how OER are licensed for use, some of which simply allow copying and others that make provision for users to adapt the resources that they use.’ (OER Africa, 2010).

¹⁰⁶ <http://en.wikipedia.org/>

¹⁰⁷ <http://www.olcos.org/english/roadmap/>

¹⁰⁸ <http://www.oerafrica.org/>



Open Courseware Consortium

The [OCW](http://www.ocwconsortium.org/)¹⁰⁹ uses the term Open Courseware, which is closely associated with Open Educational Resources:

‘An OpenCourseWare (OCW) is a free and open digital publication of high quality university-level educational materials. These materials are organized as courses, and often include course planning materials and evaluation tools as well as thematic content.

OpenCourseWare are free and openly licensed, accessible to anyone, anytime via the internet.’ (OpenCourseWare Consortium, 2010).

MIT OpenCourseWare

[MIT OpenCourseWare](http://ocw.mit.edu/)¹¹⁰ uses a different term - OpenCourseWare, and presents a concise description of what they are trying to accomplish through the distribution of Open Courseware:

‘MIT OpenCourseWare (OCW) is a web-based publication of virtually all MIT course content. OCW is open and available to the world and is a permanent MIT activity. MIT OpenCourseWare is a free publication of MIT course materials that reflects almost all the undergraduate and graduate subjects taught at MIT.

- OCW is not an MIT education.
- OCW does not grant degrees or certificates.
- OCW does not provide access to MIT faculty.
- Materials may not reflect entire content of the course.’

(MIT OpenCourseWare, 2010).

The site is clear that it provides materials or resources and not qualifications or distance education, which includes interaction between teacher and student, assessment and certification.

OER Commons

The [OER Commons](http://www.oercommons.org/)¹¹¹ Wiki describes itself as ‘a shared workspace for individuals and groups of educators to develop and share open educational resources’ and goes on to define OER as:

‘Open Education Resources (OER) are teaching and learning materials freely available online for everyone to use, whether you are an instructor, student, or self-learner. Examples of OER include: full courses, course modules, syllabi, lectures, homework assignments, quizzes, lab and classroom activities, pedagogical materials, games, simulations, and many more resources contained in digital media collections from around the world.’ (OER Commons, 2011a).

¹⁰⁹ <http://www.ocwconsortium.org/>

¹¹⁰ <http://ocw.mit.edu/>

¹¹¹ <http://www.oercommons.org/>



Discussion on Definitions

The common approach to OER appears to be in these elements:

- Access to OER should be free of charge, provided the user has his or her own access to the Internet.
- Materials must be available for re-use without charge.

There is deviation in approaches after this point that includes differences of opinion in areas such as:

- For profit versus non-profit use of the materials (this relates to the Creative Commons non-commercial restriction discussed later in this report),
- The right to customize materials without having to ask the original creators' permission to do so or to check the final product (this relates to the Creative Commons no derivatives restriction discussed later in this report).

The lowest common denominator for a definition for OER therefore appears to most strongly aligned with the definition provided by OER Africa which we present: **'Open Educational Resources (OER) are educational resources that are freely available for use by educators and learners, without an accompanying need to pay royalties or license fees.'** (OER Africa, 2010).

Further, due to the lower cost of sharing materials over the Internet rather than from hand-to-hand, we recommend the idea of materials **needing to be digitized**. This idea has been consistently used since 2000 when the term was first used in the UNESCO meeting that coined the term. Once an OER in digital format has been selected for use, it may be converted into print or other physical format to make it accessible for instance to people who do not have computers or Internet access; or for art classes or medical training facilities. (See for example the 3D printing machines released by the [RepRap Project](#)¹¹²).

The format of digitized files and issues around copyright will be discussed later in this report, which will further impact on the comprehensive definition or description of OER. The **description of OER** is:

Open Educational Resources (OER) are digitized educational resources that are freely available for use by educators and learners, without an accompanying need to pay royalties or license fees. The digitized resources may be shared via the Internet or using media such as disk-drives. OER are usually but not exclusively licensed using Creative Commons licenses. Both the original owners of the material and the subsequent users need to clearly understand the terms of these contracts to appreciate the ways in which materials may be remixed and shared.

¹¹² http://en.wikipedia.org/wiki/RepRap_Project



The OER Infrastructure

Traditional institutions that have joined the OER movement

Some of the institutions that have supported the creation, customization and use of OER have already been mentioned. A comprehensive [list of providers](#)¹¹³ can be found on the OERCommons website. These are examples of institutions that have recognized that the learning content is only one part of what they are providing to learners and that the majority of the service provided to registered learners is contained in the learner support, assessment and accreditation. The learning content when released free, provides a number of benefits. The availability of the content:

- Acts as a marketing tool to show prospective learners what quality content will be available to learners who do register;
- Shows other institutions the standard of quality available at the institution;
- Can be an indicator of the quality of educators at the institution to support registered learners;
- Shows that the institution is serious about benefitting the world with the research and other knowledge gained by the institution.

If the institution does not have good educators, good quality learning materials and good quality learner support, etc., it may be better for these institutions to keep their learning content well hidden from the rest of the world!

Creating and providing OER to the world is one aspect of sharing. Once an institution starts accepting OER from other institutions, especially other parts of the world, one can start believing that sharing is happening. Canada's Athabasca University has trained its educators to first search the Internet for OER, before investing time and money into developing new materials (WikiEducator, 2011b).

The sharing of OER cannot be a one-way flow from industrialized countries to the developing world. Both "worlds" have knowledge to be shared with the other. The example of the Commonwealth of learning collaborating with educators in 5 countries, representing both the developed and developing parts of the world, to create learning content for grades 10 to 12 learners is a case in point.

The rise of the alternative institutions

Some sites previously mentioned, such as [WikiEducator](#)¹¹⁴ and [Wikiversity](#)¹¹⁵, provide basic infrastructure for any person to offer almost any course online. No accreditation is offered by these sites at this stage, although when the course and its assessment is acknowledged by an institution registered in a particular country, the course can also be accredited. If organizations such as these secure accreditation for the courses they offer, through the efforts of a global collaboration of educators, they could become accredited institutions operating seamlessly across borders.

Some more formal organizations or institutions are also beginning to appear, that offer free or very low cost education via the Internet. One example is the [University of the People](#)¹¹⁶ (UoPeople) that says: 'UoPeople is the world's first tuition-free online academic institution dedicated to the global advancement and democratization of higher education. The high-quality low-cost global educational model embraces the worldwide presence of the Internet and dropping technology costs to bring university-level studies within reach of millions of people across the world. With the support of respected academics, humanitarians and other visionaries, the UoPeople student body represents a new wave in global education.' (University of the People, 2010).

¹¹³ <http://www.oercommons.org/oer/providers>

¹¹⁴ <http://www.wikieducator.org>

¹¹⁵ <http://www.wikiversity.org>

¹¹⁶ <http://www.uopeople.org/>



The [DiUlus Institute](http://www.diulus.org/)¹¹⁷ is an organization that is an Internet-based, experimental, higher education and tuition-free institution. Their website states that the Institute: ‘is all about cutting edge curriculum and instruction -- First to serve as a model for established traditional schools to create and develop their own virtual content curriculum and learner management platforms and secondly to provide selected and qualified individuals the opportunity to be appointed [DiUlus Scholars](http://www.diulus.org/diulus_scholars.html)¹¹⁸ and matriculate from anywhere in the world as tuition free learners. As a model showcase, The DiUlus Institute demonstrate innovative pedagogy, technology, and methodology well beyond what is currently available in the realm of online higher education.’ (DiUlus Institute, 2010).

The [People's Open Access Educational Initiative](http://www.peoples-uni.org/)¹¹⁹ or the Peoples-uni, was registered in January 2007. Their website states: ‘Our aim is to help with Public Health capacity building in low- to middle-income countries, through Internet based education. The use of Open Educational Resources freely available on the Internet, and volunteers to staff the Initiative, allows this to be offered at very low cost.’ (Peoples-uni, 2010). This organization does not provide completely free education, but rather at low cost.

The success of Distance Education and the failure of Online Learning (eLearning)

‘Distance education, or distance learning, is a field of education that focuses on the pedagogy, technology, and instructional system designs that aim to deliver education to students who are not physically "on site" in a traditional classroom or campus. It has been described as "a process to create and provide access to learning when the source of information and the learners are separated by time and distance, or both." In other words, distance learning is the process of creating an educational experience of equal quality for the learner to best suit their outside the classroom.’ (Wikipedia, 2011).

‘E-learning comprises all forms of electronically supported learning and teaching. The Information and communication systems, whether networked or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum.’ (WikiPedia, 2011).

The breakthrough in distance education is often reported as the ability to increase the numbers of learners per ‘classroom’ or learner intake, while maintaining high standards of learning. The more learners, the lower the cost of producing learning materials per learner. These savings in funds can then be invested in improved learner support, such as discussion groups, which are either held within reach of the learners or held using a technology like teleconferencing. By using technology appropriately, class sizes have risen to thousands of learners. In these cases, dozens of additional tutors are hired to provide learner support.

Online class sizes seem to range typically from about 12 to 25 learners (Sener Knowledge LLC, 2010) and (Oestmann, 2009). In traditional face-to-face auditoriums of higher education institutions, one often has hundreds of learners in a course. Distance education can accommodate thousands of learners in one intake. The quality of learning in tiny classes may be considered ideal by those who can afford it, but what of the tens of millions of people who cannot access these forms of elitist education?

For OER to make a significant difference in the world of secondary and tertiary (higher) education, large-scale online classes of very low cost and free education will need to be provided. If the shortages of bandwidth and equipment can be improved through the creativity of grant agencies, governments and companies, the next challenge will be for enough large-scale institutions to be created to offer education to the newly connected. Realizing that few individuals will have conventional computers (even netbooks), delivery is likely to be via 3G and 4G cellular instruments.

¹¹⁷ <http://www.diulus.org/>

¹¹⁸ http://www.diulus.org/diulus_scholars.html

¹¹⁹ <http://www.peoples-uni.org>



Platforms

Learning Management Systems (LMS)

This section cannot provide comprehensive cover of all the available Virtual Learning Environments (VLE) or Learning Management Systems (LMS) and Learning Content Management Systems (LCMS), as they are also referred to. Some of the platforms such as Moodle are broadly used across the world, but there are many others that are used to varying degrees such as [SAKAI](#)¹²⁰, [Chisimba](#)¹²¹ (previously called KEWL.NextGen), and [ATutor](#)¹²². A new platform is under development by Microsoft codenamed “Uluru” (named after Ayers Rock, a large sandstone rock formation in the southern part of the Northern Territory, central Australia) and may provide a new perspective in 2011. Microsoft already hosts free global services for storing files ([Skydrive](#)¹²³), email and so on. Uluru is planned to be a global virtual learning platform that any institution can use free of charge. An experimental platform, Uluru will provide for the delivery of audio and video interactive media via mobile devices and computers.

Users of open source platforms such as SAKAI, Chisimba, and ATutor continue to move forward on their separate paths, even though they employ what can broadly be described as “open standards”. The attraction to platforms such as the proposed Microsoft “Uluru” along with the other services already provided free of charge, is expected to continue to split the possibility of one global platform into the use of multiple platforms.

These LMS platforms have been developed and tested for more than 10-years and have a significant following of institutions and teachers. There are a few Internet hosting companies that will provide the technology for institutions and teachers, but frequently institutions have to provide substantial levels of technical support to teachers and learners.

Wikis

Could one global platform for learning be created if it approached the challenge from an entirely different angle? For example, if one moved rather towards a concept of a global wiki to develop learning content, deliver it to learners, support learners creating content and additional knowledge, and even do the assessment of learners online within the wiki?

The logic of having a globally shared platform to support education sounds positive, but again one becomes aware of the seemingly insurmountable differences between the various stakeholders. Even when ‘open standards’ and ‘open licenses’ are used, combining existing (and future) platforms seems unlikely. If one follows the path of one set of standards and one set of technologies, one can quickly reach the conclusion that the platform will simply be controlled by one or another powerful lobby group of people.

An example of two seemingly similar projects are WikiEducator and Wikiversity.

The WikiEducator platform states:

‘The WikiEducator is an evolving community intended for the collaborative:

- planning of education projects linked with the development of [free content](#)¹²⁴;

¹²⁰ <http://sakaiproject.org/>

¹²¹ <http://www.chisimba.com/>

¹²² <http://atutor.ca/>

¹²³ <http://explore.live.com/windows-live-skydrive>

¹²⁴ <http://freedomdefined.org/Definition>



- development of free content on [Wikieducator](#)¹²⁵ for e-learning;
- work on building open education resources (OER) on how to create OER.
- networking on [funding proposals](#)¹²⁶ developed as free content.’

WikiEducator (2011).

The similarities between WikiEducator and Wikiversity alone show that seemingly like-minded groups, both using the same basic software (MediaWiki) and the same copyright license (CC-BY-SA) cannot agree to share the same infrastructure or platform. There is little reason for them to do so either as too few platforms reduce ‘innovative competition’ and increase the risk of the only world platform failing. It would be better to find ways for organizations to cooperate with each other while following the missions of their respective communities.

The Wikiversity platform states: ‘[Wikiversity](#)¹²⁷ is a [Wikimedia Foundation](#)¹²⁸ project devoted to [learning resources](#)¹²⁹, [learning projects](#)¹³⁰, and research for use in all levels, types, and styles of education from pre-school to university, including professional training and informal learning. We invite teachers, students, and researchers to join us in creating [open educational resources](#)¹³¹ and [collaborative learning communities](#)¹³².’ (Wikiversity, 2011).

These two projects use the same copyright license, a similar goal of providing free learning content to the world, both depend on a large group of volunteers who are willing not only to contribute their time and energies to creating content, but also to allowing any individual or corporation to use their contributions for commercial gain. Even with all the similarities, these two projects and others do not collapse their platforms into one system.

The Wikiversity and WikiEducator projects pay particular attention to text content and can therefore interact with lower bandwidth regions of the world more easily than some of the rich-media projects. [Academic Earth](#)¹³³ provides videos on a wide range of topics that can be downloaded and used free of charge. The bandwidth required for viewing these videos would be beyond the reach of the majority of teachers or lecturers in the developing world. The issue of copyright on these sites will be focussed on later in this report.

The greatest benefits of the wiki technologies are that they are amongst the lowest bandwidth-hungry technologies available. They also enable people in developing countries to participate, whereas they may frequently be kept away from contributing to projects in industrialized countries. Wikis are limited to simpler forms of learning materials (frequently only text) and they have limited copyright options for contributors (contributors must give away commercial rights to anyone). Importantly, they form a lowest-common-denominator technology for the creation, customization and sharing of OER.

¹²⁵ <http://wikieducator.org/Content>

¹²⁶ <http://wikieducator.org/Metawikieducator>

¹²⁷ <http://en.wikiversity.org/wiki/Wikiversity:Welcome>

¹²⁸ <http://en.wikiversity.org/wiki/Wikimedia>

¹²⁹ http://en.wikiversity.org/wiki/Learning_resource

¹³⁰ http://en.wikiversity.org/wiki/Learning_projects

¹³¹ http://en.wikiversity.org/wiki/Open_educational_resources

¹³² http://en.wikiversity.org/wiki/Wikiversity:Learning_community

¹³³ <http://academicearth.org/>



OER Glue

Still in concept form at the time of writing, the [OER Glue](#)¹³⁴ website states: ‘to efficiently assemble courses and teach online by “glueing together” open education resources (OER) and integrating with popular online services including Google Documents, Blogs, Facebook, Twitter, and discussion and assessment tools. OER Glue’s web browser add-on approach allows it to wrap context and navigation tools around online content and to integrate content and services from multiple sources in a coherent manner.’ (OER Glue, 2011).

This method may be a winner for educators and learners who are well connected, but not able to support people in low or no-bandwidth parts of the world.

Virtual Science Laboratories

Institutions have developed online science laboratories that can help learners to visualize experiments for which they do not have equipment, or may be too expensive to run. Examples of these are [N. Simonson & Company’s Virtlab](#)¹³⁵, The [University of Virginia Virtual Lab](#)¹³⁶ and [Science Daily’s Virtual Lab](#)¹³⁷. For learners in parts of the world that have no science laboratories, virtual facilities such as these, all available under a single ‘meta-university platform’, would be so much more advanced that their available technology that it may sound like science fiction. The reality is that even if the learners had Internet connection, the bandwidth that is available in Africa, South and Southeast Asia is so slow and so expensive, that schools and universities have to treat the Internet as a luxury rather than a gateway to the world’s knowledge. Broadband lines are required for this kind of technology to make an impact on the majority of the world.

¹³⁴ <http://blog.oerglue.com/about/>

¹³⁵ <http://www.virtlab.com/>

¹³⁶ <http://virlab.virginia.edu>

¹³⁷ http://www.sciencedaily.com/videos/2007/0809-virtual_lab.htm



Learning content repositories

Numerous repositories, or databases of learning materials have been established. Examples are the MIT collection of classroom-based learning resources, and The UKOU's collection of course modules in their OpenLearn project. The difficulty any teacher or learner will have with all repositories typically include where to find them, how to assemble them into a form that can be easily used and how to make sure that the material is appropriate, accurate and sufficient?

The University of Maryland College has set up a webpage simply called '[Open Educational Resources](#)¹³⁸', to guide teachers and learners to OER collections. The OERCommons has established a much longer list of resources titled '[Browse Collection Providers](#)¹³⁹'. This collection provides a meta-search facility across all the resources they have catalogued. Collections such as these require extensive work to maintain, but provide a level of quality control that other more automated or manual but laissez-faire methods cannot guarantee.

A future system of OER will need a simple-to-use system of classification and search that enables teachers and learners who have limited, expensive and occasional bandwidth to be able to access and find appropriate materials quickly. Appropriate may mean that they relate to the country, culture and language, but it may also mean that the content is content rich (high bandwidth) or simple text (low bandwidth), to suit the circumstances.

Where manual cataloguing systems are found to be uneconomical and too labour intensive, automated systems may have to be the main alternative. The [Google Custom Search](#)¹⁴⁰ facility was deployed by the Commonwealth of learning to [search for open educational resources](#)¹⁴¹. This technology is provided free of charge by Google (even the advertising can be turned off for non-profit uses) and enables users to search using familiar technology.

The Internet-in-a-box concept

An idea that could compliment the thinking of a global platform for teaching and learning (the OPLI) is the [eGranary](#)¹⁴² project of the University of Iowa in the USA (Missin, 2010). The latest version of the eGranary includes some 14 million educational resources and dynamic capabilities, including a feature called the Community Information Platform (CIP). The eGranary project originated from the concept of an internet on a hard drive for locations where there is little or no Internet connectivity. If the 2 terabyte hard drive contains all the available OER available from around the world, educators who most need resources and have the least likelihood of being able to access them due to expensive and limited bandwidth, could have access to the largest collection possible.

¹³⁸ <http://libguides.umuc.edu/content.php?pid=98930&sid=742391>

¹³⁹ <http://www.oercommons.org/oer/providers>

¹⁴⁰ <http://www.google.com/cse/>

¹⁴¹ <http://www.col.org/oer>

¹⁴² <http://www.widernet.org/egranary/>



Copyright

The author of an original work automatically has copyright in that work even if the work carries no copyright symbol © or statement that all rights are reserved. Using such a work in an OER without getting permission from the copyright holder is a breach of copyright. It should also be born in mind that the author or creator of a work may not be the holder of the copyright; the author may for example, as part of an employment contract, signed over all copyright of materials created to the employer. There are a few exceptions in individual countries' laws, which may permit some copyrighted materials to be used in classrooms, though usually not online or for distance learning. There are also fair use or fair dealing sections of copyright laws which allow small sections to be used, again, in a classroom setting. Apart from some special cases such as those mentioned above and with public domain works, it is a breach of copyright to convert a copyrighted work from one format into another. So, for example, scanning a book, article or picture is itself a breach of copyright (Hofman, 2011).

There is nothing to stop any copyright holder from drafting his or her own license and there are a number of copyright licenses available for copyright holders to use (Hofman, 2011). The licenses most often used for education content that is distributed free of charge, are available from [Creative Commons](http://creativecommons.org/)¹⁴³. The website offers a license selector that will help the user to select the most appropriate license based on a series of seemingly simple questions. An easy-to-read book on the topic, which can be downloaded free, is available from the Commonwealth of Learning at: <http://www.col.org/IntroducingCopyright>¹⁴⁴ (Hofman, 2009). Chapter 8, on Open Licenses describes the terms in use and OER teams are strongly advised to consult this and other sources to try to determine the meaning of the terms. The main licenses found are: “CC-BY”, “CC-BY-SA”, “CC-BY-NC”, “CC-BY-ND”, “CC-BY-NC-SA”, “CC-BY-NC-ND”. A user guide for educators can be found on the Creative Commons site at: <http://tinyurl.com/3n2d2jk>

The license that allows users to make the widest use of an OER is “Creative Commons - By Attribution” or CC-BY. This means that the work may be customized and used in any way, including for commercial gain without recourse to the rights holder, provided attribution is given. Often, CC-BY-SA or “Creative Commons - By Attribution - Share Alike” is used, which add the requirement for the customized works to also be shared in a similar manner to how the original was received; this usually means publishing the newly customized work on the Internet so that others can also benefit from it, free of charge.

There are two additional ‘restrictions’ as they are called, that need to be considered more carefully. The first is ‘non-commercial’ and the second is ‘no-derivatives’.

Non-commercial on the surface of it simply states that no commercial use may be made of the work. The Introduction to Copyright book states:

‘One view of what this means, often forcefully expressed in workshops and discussion groups, is that non-commercial means that no money should change hands. The usual meaning of non-commercial, however, is that money may change hands if this is part of cost-recovery. Cost recovery, typically, would include copy charges, salaries and overhead expenses. The only restriction is that anyone doing this does not intend to make a profit out of distributing the work. This is the view of the Draft Guidelines that CC published to try to clarify the meaning of non-commercial.

Some uncertainty, however, still surrounds what section 4b means by “primarily intended for or directed toward commercial advantage or private monetary compensation”. It could be argued that even if a project does make a profit, the use is still non-commercial if the project was not primarily intended to make a profit. According to this view, an organization that is run for profit may use NC material and may recover its expenses for distributing NC material provided the project using the NC licensed material does not aim at making a profit.’ (Hofman, 2009).

There are ample arguments for and against the use of the non-commercial restriction. Firstly, for not using the noncommercial restriction: By everyone giving their works freely for others to use, one places no restriction on how the work is to be used. It can be combined with any other work with a similar license and the user can make a living

¹⁴³ <http://www.creativecommons.org>

¹⁴⁴ <http://www.col.org/IntroducingCopyright>



without the worry of possibly contravening a law in their own or another country. Organizations and educators that do not use the NC restriction accept that others may use their works for both cost recovery and profit (profit is the money that is left over after all costs, including salaries have been paid).

Some organizations and educators prefer to give their works away free of charge, but should the user plan to make more money than to 'recover costs' (which appears to include their salaries), they would prefer the user to first approach the rights holder to discuss a profit sharing or royalty payment. The confusing part in this is that the Creative Commons License is not absolutely clear on the exact meaning of the term non-commercial and interpretations vary between countries and between legal professionals.

The no-derivatives (ND) restriction is probably the most unlikely restriction to use in the Creative Commons range of licenses for OER, but rights holders or authors may want to at least understand where it could be useful. The ND restriction tells the user that the work may be duplicated and used free of charge, but may not be changed in any way. If any changes are made, this would be a copyright infringement and the work would then no longer be attributed to the original author in any way as the author is no longer sure of the accuracy of what is stated in the document.

A document where the author might not want any changes to be made while it carries his/her name might be a legal, medical or some other document that could negatively affect the safety of people or possessions, should an error creep into the work during customization. A particular challenge in using the ND restriction is in the case of a book. Should a substantial part the book be required but not the whole book, this is not allowed. In some countries, copyright law allows educators to use small parts of a copyrighted work without getting permission, provided the part copied is properly attributed. This is known as fair dealing or fair use in some countries. This feature of copyright law varies from country to country and even lawyers are not always sure how much it allows by way of copying. Because the law varies from country to country, what is fair dealing in an OER published online in one country may be a breach of copyright when that OER is used in another country (Hofman, 2011).

A cursory review of repository sites shows that the most popular CC licenses for OER appear to be:

- "CC-BY", "CC-BY-SA", "CC-BY-NC", "CC-BY-ND", "CC-BY-NC-SA", "CC-BY-NC-ND"
- Sites that use the NC clause include: MIT, the UKOU and the OER Commons.
- Sites that do not use the NC restriction include: WikiEducator, Wikiversity and Connexions.

To ease the future sharing, customization and re-use of OER, the following will be needed:

- Clarity on the **legal** meanings of terms used in the Creative Commons copyright licenses (this will need to be as universal, across jurisdictions as possible).
- The clarity of terms is especially important with respect to the meaning of 'NC' (if for example, 'NC' is to be defined to not allow for the recovery of all costs, another term would need to be introduced to allow for this).
- Agreement on how to combine and appropriately reference works with different Creative Commons licenses, into a single new work.
- Strong recommendations to governments to clarify and update the fair use/fair dealing clauses in national copyright legislation, so that it does not hamper the spread of education.

Any breach of copyright could end in a lawsuit brought by the copyright holder. The copyright holder is often not the author, but the publisher and publishers are often more aggressive than individual authors in protecting their rights. If a copyright holder does sue, the employer of the individual who used the copyrighted material will also be liable for any breach of copyright by its employee. This means that materials should never be used in an OER unless the copyright holder has given permission, unless if the section copied is very small and can comfortably be classified as fair use or fair dealing. The copyright holder can give permission either in response to a request by someone wanting to use the work or by attaching a copyright license to the work (Hofman, 2011).



To help make works that carry Creative Commons licenses more visible when surfing, [Open Attribute](http://openattribute.com/)¹⁴⁵ has been established that creates a plug in for certain browsers that shows the CC logo in the address bar of the browser. By clicking on the CC logo when it appears, the plug-in helps the user to correctly attribute the source. This is still in beta and not available for all browsers or websites as yet.

Mixing content with different CC licenses and referencing copyright licenses

There is a strong debate about how content that carries different Creative Commons licenses can be mixed. Consider that throughout this report, many items have been quoted from other sources and you will find citations for each of these. When using OER created by another person, organization or community, the user (the person compiling the new work or learning material) will have to check the specific license and cite this at the same time as citing the source. There is a useful quiz for testing the compatibility of licenses on the Creative Commons website:

<http://creativecommons.org.tw/licwiz/english.html>

A standard for citing works that carry different licenses in a new work has not yet emerged, although there are a number of methods for generally citing works that are introduced in research works and academic papers. One possible method will be to include a note on the specific license in the bibliography of documents in future. For example, when citing: **(Wikipedia, 2011)**, one may need to adapt this to: **(Wikipedia, 2011, CC-BY-SA)**. Users or readers of the new work or learning material would then be sufficiently notified to take care to not contradict the terms of the copyright notice.

Agreement with the citation systems such as the APA ([American Psychological Association](http://www.apastyle.org/)¹⁴⁶) will need to be secured to standardize how this should be done. The APA shows users 'how to structure and format their work, recommends ways to reduce bias in language, identifies how to avoid charges of plagiarism, shows how to cite references in text, and provides selected reference examples' (APA, 2011).

¹⁴⁵ <http://openattribute.com/>

¹⁴⁶ <http://www.apastyle.org>



How to find OER

There are a number of catalogues and search facilities to find OER. The sites listed here are a sample of search facilities, listed in alphabetical order, that search or list OER from multiple institutions or organizations.

Commonwealth of Learning (COL)

Look for the search field for OER. COL maintains a Google Custom Search field of all the sites they deem appropriate. Institutions included in the search are listed on the page below the search field.

[Search for ocv/oer material](#)¹⁴⁷

Curriki

‘Searching for Open Educational Resources, but not sure where to start looking? Use these OER search engines to find educational content in any field.’ The page is titled:

‘[Look no Further for OER Search Engines](#)¹⁴⁸’ (Curriki, 2010).

OER Africa

‘This space is where African educators (other users) can find OER on the Internet. Its focus is threefold, provide a home for African OER that is not being hosted anywhere else online; maintain a detailed catalogue of all online OER provided by Africans to showcase African OER and present an online ‘map’ for African educators to help them locate the best sources of OER online from around the world. Use the search facility below to search our database or select any of the links below to find resources by theme.’ (OER Africa, 2010a).

‘[Finding OER. Tools and links to find the best OER](#)’¹⁴⁹

OER Commons

Find Free-to-Use Teaching and Learning Content from around the World. This is a catalogue of selected resources.

‘[Advanced search](#)’¹⁵⁰

WikiEducator’s Exemplary Collection of Open eLearning Content Repositories

This is not a search facility, but rather a comprehensive list of catalogues and search facilities of

‘[Open eLearning Content Repositories](#)’¹⁵¹.

DiscoverEd

‘[DiscoverEd](#)’¹⁵² is a search prototype developed by Creative Commons to explore metadata enhanced search, specifically for OER. While most search engines rely solely on algorithmic analyses of resources, DiscoverEd can incorporate data provided by the resource publisher or curator. DiscoverEd supports several common metadata formats, including OAI-PMH and RDFa. The use of these formats allows otherwise unrelated educational projects, curators, and repositories to express facts about their resources in the a way that tools (like DiscoverEd) can use for purposes like search and

¹⁴⁷ <http://www.col.org/oer>

¹⁴⁸ <http://blog.curriki.org/2010/07/02/look-no-further-for-oer-search-engines/>

¹⁴⁹ <http://www.oerafrica.org/FindingOER/tabid/294/Default.aspx>

¹⁵⁰ <http://www.oercommons.org/>

¹⁵¹ http://wikieducator.org/Exemplary_Collection_of_Open_eLearning_Content_Repositories

¹⁵² <http://wiki.creativecommons.org/DiscoverEd>



discovery. DiscoverEd is a project that allows us to explore ways to improve search for OER, and simultaneously demonstrate the utility of structured data. DiscoverEd is built on [Nutch](#)¹⁵³.

Creative Commons maintains an experimental instance of DiscoverEd at <http://discovered.labs.creativecommons.org>.’ (Creative Commons, 2011).

The OLE Library Network

‘OLE¹⁵⁴ is in the process of developing a multilevel digital library network designed to make high quality open learning resources available to all children, even in the most remote parts of the world. The OLE Library Network is designed to work from the global to the personal levels.’ (Open Learning Exchange, 2011).

The [Billion Kids Library](#)¹⁵⁵

Free Text Book Projects

Not one project, but rather many free text book projects that are growing in their numbers. Projects vary widely from collaboratively written books to scanned books where you can only see a page or two at a time due to copyright restrictions.

[Textbook Revolution](#)¹⁵⁶ is a student-run site dedicated to increasing the use of free educational materials by teachers and professors.’ (Textbook Revolution (2011).

[Bookboon](#)¹⁵⁷ provides online textbooks for students in PDF format.

[Global Text Project](#)¹⁵⁸ provides books in open document format (ODF).

[Flatworld Knowledge](#)¹⁵⁹ is a publisher that provides both free and printed text books.

[CK-12 Foundation](#)¹⁶⁰ (the [California Free Digital Textbooks Initiative](#)¹⁶¹) has a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide.

¹⁵³ <http://lucene.apache.org/nutch/>

¹⁵⁴ <http://ole.org/toolkit/library/>

¹⁵⁵ <http://library.ole.org>

¹⁵⁶ <http://textbookrevolution.org>

¹⁵⁷ <http://bookboon.com/int/student>

¹⁵⁸ <http://globaltext.terry.uga.edu/books>

¹⁵⁹ <http://www.flatworldknowledge.com/catalog>

¹⁶⁰ <http://www.ck12.org/flexbook/>

¹⁶¹ <http://www.ck12.org/about/ca/freetextbooks>



Organizations that have lead the progress of OER

As a William and Flora Hewlett Foundation report states: ‘At the heart of the movement toward Open Educational Resources is the simple and powerful idea that the world’s knowledge is a public good and that technology in general and the World Wide Web in particular provide an extraordinary opportunity for everyone to share, use, and reuse knowledge.’ (Atkins, et al, 2007).

During the first nearly 10 years of the OER movement, much attention has been given to the creation and sharing of learning content. Amongst the most notable projects often cited are the financial contributions made to Massachusetts Institute of Technology (MIT) and the United Kingdom Open University (UKOU). The logic model provided by Atkins for the Hewlett Foundation work, gives the intention of the project as helping to equalize access to high-quality open content (learning materials). They intended to accomplish this by supporting the removal of barriers to the use of OER and through the stimulation of their use, by sponsoring specific projects. This is shown in the diagram below.

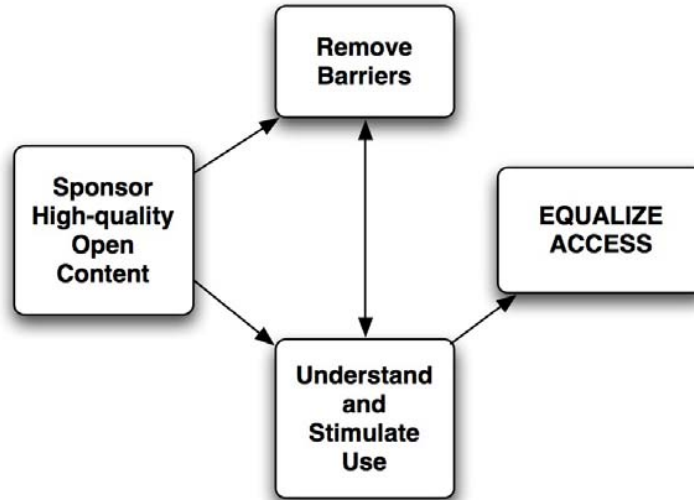


Figure 2: Open Educational Resources Logic Model
(Atkins, et al, 2007)

The success of the OER movement was thought to depend on what has emerged as a *culture of contribution* (Atkins, 2007). The individual investments made to institutions and other organizations to promote the creation and use of OER provides examples and some start towards ‘bulk’ of content. The proliferation of content depends on the groundswell of people who both believe in and participate in the movement. This depends heavily on the ideals of the movement making sense to people at individual and organizational levels. The investments needed to create and proliferate OER and their use, will have to include the re-direction of existing production costs, rather than only investments from agencies such as the The William and Flora Hewlett Foundation.

The Atkins report, published in February 2007 (Atkins, et al, 2007) lists the projects funded by the Hewlett Foundation through to 2007, which have led to a substantial collection of resources on multiple websites. These are not



reproduced in this report and the reader is advised to obtain this detail in their report: [A Review of the Open Educational Resources \(OER\) Movement: Achievements, Challenges, and New Opportunities](#)¹⁶².

Global Network for Higher Learning

One of the concepts outlined and recommended by Atkins (Atkins, et al, 2007) is an “OPLI”, or Open Participatory Learning Infrastructure, that would become a global learning ecosystem. The ecosystem would be made visible through a collection of technologies that together, forms a platform to support learning. This platform may directly support learning or may be used by the world’s estimated 8,000 higher education institutions in their mission to support learning. In summary, the OPLI would provide the:

- (1) ‘creation and provision of infrastructure;
- (2) meaningful and transformative use of the infrastructure; and
- (3) discovery and transfer of the fruits of relevant research into future generations of the infrastructure.’ (Atkins, et al, 2007).

On first inspection, the idea of the OPLI does not appear to have progressed formally since it was suggested in 2007, although the thinking behind the OPLI may have further stimulated the founders of collaborative projects promoting OER. Further investigation brings to the surface, the concept of a Meta-University, referred to in the May/June 2007 edition of *Educause* by Charles M. Vest, President Emeritus of the Massachusetts Institute of Technology (MIT):

‘My view is that in the open-access movement, we are seeing the early emergence of a meta-university—a transcendent, accessible, empowering, dynamic, communally constructed framework of open materials and platforms on which much of higher education worldwide can be constructed or enhanced. The Internet and the Web will provide the communication infrastructure, and the open-access movement and its derivatives will provide much of the knowledge and information infrastructure. If this view is correct, the meta-university will enable, not replace, residential campuses, especially in wealthier regions. It will bring cost-efficiencies to institutions through the shared development of educational materials. It will be adaptive, not prescriptive. It will serve teachers and learners in both structured and informal contexts. It will speed the propagation of high-quality education and scholarship. It will build bridges across cultures and political boundaries. It will be particularly important to the developing world. The emerging meta-university, built on the power and ubiquity of the Web and launched by the open courseware movement, will give teachers and learners everywhere the ability to access and share teaching materials, scholarly publications, scientific works in progress, teleoperation of experiments, and worldwide collaborations, thereby achieving economic efficiencies and raising the quality of education through a noble and global endeavor.’ (Vest, 2006).

Early symptoms of such an OPLI could be ventures such as [WikiEducator](#)¹⁶³ and [Wikiversity](#)¹⁶⁴. Both projects aim to develop and provide free learning content to anyone. In the case of WikiEducator, the website invites people to: ‘Please join us in developing free and open educational content for the world!’ (WikiEducator, 2010). In some cases, institutions and independent educators use these platforms to run courses online, even though the course materials can be changed at any moment by any person on the Internet. The platforms already provide a dynamic way to offer courses in a way that participants or learners can create or enrich the content of the course as they proceed through the curriculum. According to the wiki history of their home pages, both projects were started in 2006, both pre-dating the ideas published in 2007 by the authors mentioned above. Projects such as these provide technological platforms that may be used by any institution or educator free of charge. Dedicated sub-domains could be provided at a service or membership cost to the institution.

¹⁶² http://www.hewlett.org/uploads/files/Hewlett_OER_report.pdf

¹⁶³ <http://wikieducator.org>

¹⁶⁴ <http://en.wikiversity.org>



The topic of a meta-university again surfaces in the Indian Economic Times dated 8 August, 2010, where R. Gopalakrishnan (2010) poses the question: ‘*Can India build first meta-university?*’. Gopalakrishnan (2010) describes the Meta-University as: ‘The Network for Higher Learning is conceived as going through several stages: course-content exchange, course-content collaboration, course-content co-innovation, knowledge co-creation and collaborative learning.’ The way a network of universities would function, using this concept would be: “the student also enrolls in an institution other than her ‘primary institution’ and chooses a mentor to study another discipline. Such a mentor in turn will have students from multiple institutions. A management structure pooling heads of select institutions to oversee the meta-university could be devised.’ (Gopalakrishnan, 2010).

The implications of such a meta-university system would be wide, including the need for institutions to agree to facilitate compatible technical systems (but not necessarily identical) and to have staff who are highly computer and Internet literate. The latter alone, can be a major stumbling block, as can access to technology by the institution’s learners.

In the January/February 2010 edition of Educause, Tapscott and Williams (2010) presented the concept of a Global Network for Higher Learning which further builds on the idea of Meta-Universities. They believe: ‘For universities to succeed, we believe they need to cooperate to launch what we call the Global Network for Higher Learning. This network would have five stages or levels:

- (1) course content exchange;
- (2) course content collaboration;
- (3) course content co-innovation;
- (4) knowledge co-creation; and
- (5) collaborative learning connection.’ (Tapscott and Williams, 2010).

The authors support the view of Brown and Adler (2008), that the future of higher education, universities, educators and learners needs to move from the Cartesian view of education that ‘assumes that knowledge is a kind of substance and that pedagogy concerns the best way to transfer this substance from teachers to students. By contrast, instead of starting from the Cartesian premise of ‘I think, therefore I am,’ . . . the social view of learning says, ‘We participate, therefore we are.’ (Brown, et al, 2008). Not only does the creation of course content need to be shared across multiple institutions, so does the learning by students.

The Open Educational Resources movement supports both the creation of high quality content that is shared globally, and the collaborative learning by students who are preparing themselves with the support of institutions of higher learning for the 21st century world-of-work. The potential success of global platforms lies in a discussion that crosses the boundaries of aspects such as standards, commercial rights and organizational or group power.

Selected highlights have been included in the timeline shown below.

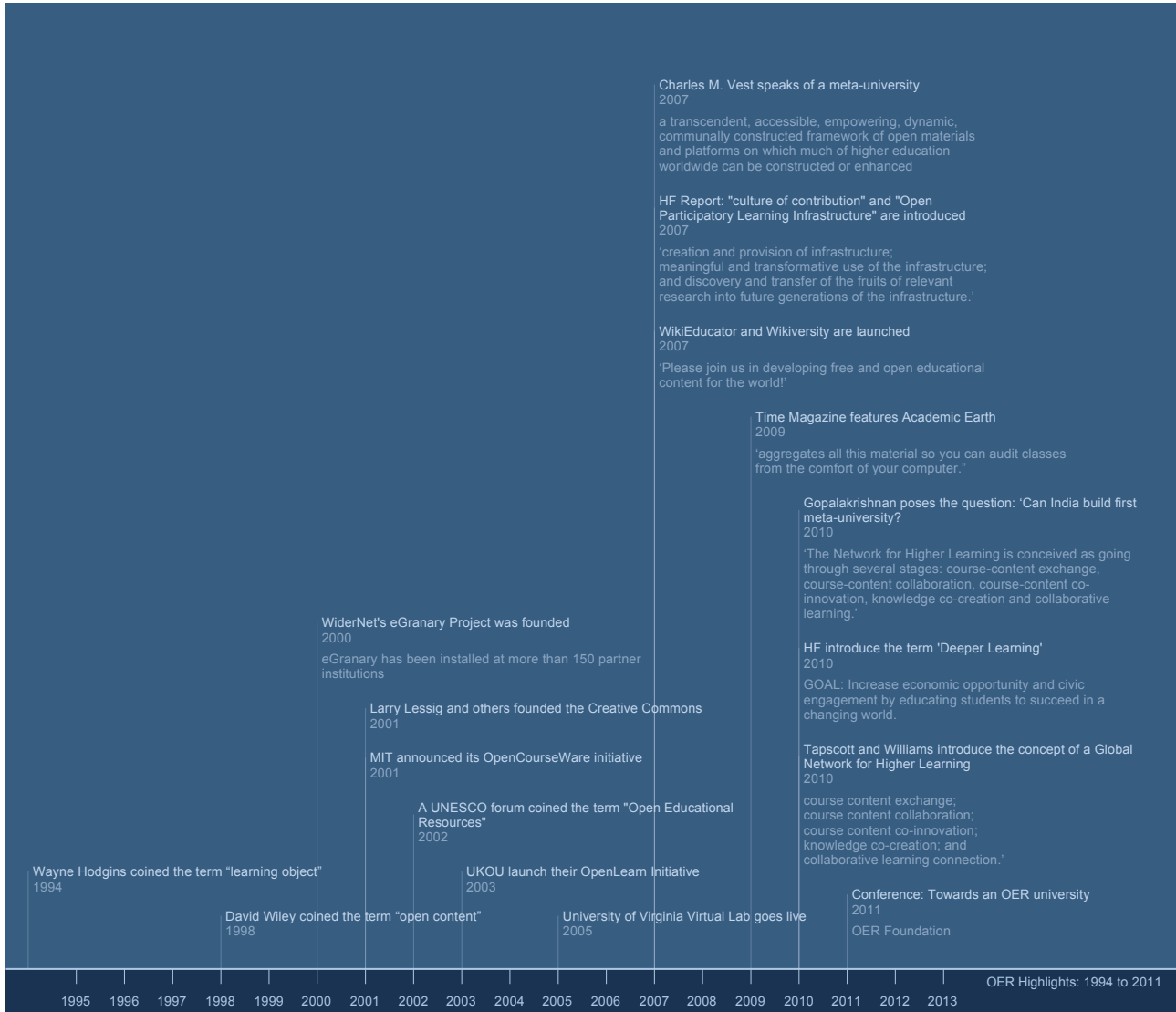


Figure 3: OER Highlights



Kinds of OER

Much of the discussion on OER centers around text-based learning content. This kind of medium is understood by any educator who can use a word processor and it is relatively easy to teach a person to edit text content in a wiki. Once one moves past the level of simply typing text, the expectations of technical skills for many educators can be higher than what they can immediately accomplish. Technical support may need to be provided to educators who want to create, customize or present OER that are more complex than text with static graphics. According to Connexions, content 'should be modular and non-linear', they believe: 'most textbooks are a mass of information in linear format: one topic follows after another. However, our brains are not linear - we learn by making connections between new concepts and things we already know.' (Connexions, 2011).

The typical range of basic technologies for OER include:

- Text - typically word processors and wikis;
- Graphics - created using cameras, mind-mapping software, graphics tablets, logic and concept drawing software;
- Movies - created using video camera, cameras built into computers or downloaded from the Internet;
- More complex OER may need computer programming such as Java.

Each technical kind of OER will require specific technical skills for its development. This list is by no means complete or even comprehensive, but serves as a few indicative examples:

- Text - MS Word, OOo Writer, Apple Pages
- Graphics - MS PowerPoint, MS Visio, OOo Impress, OOo Draw, Apple Keynote, Concept Draw Pro, ConceptDraw Mindmap, Freemind.
- Movies - MS MovieMaker, Apple iMovie, Blender, CineFX

These fairly basic computer applications may be more than many educators can cope with and if more advanced programming is needed to create for example interactive science experiments, competent programmers need to be included in the courseware development teams.



Technical Platforms for OER

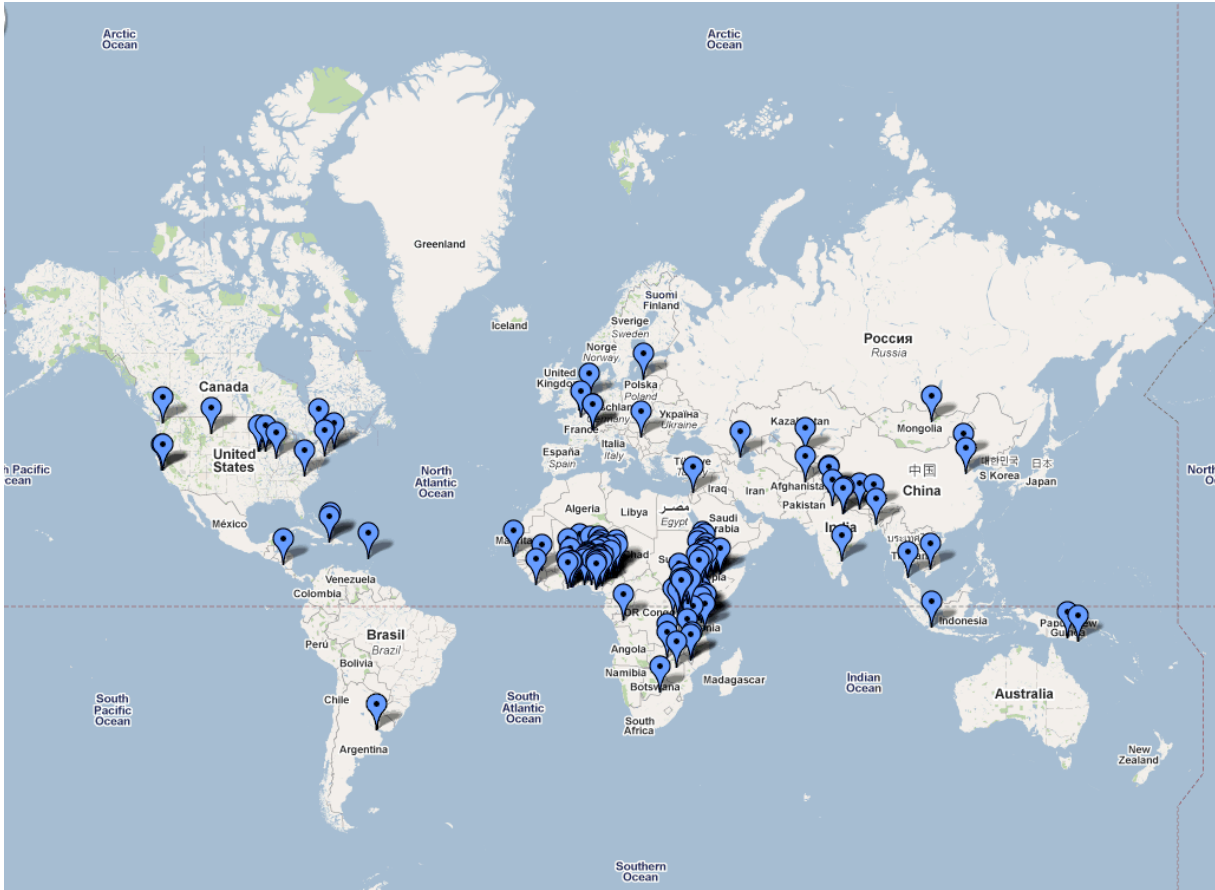


Figure 4: Installations of the eGranary in 2010
(eGranary Digital Library, 2010)

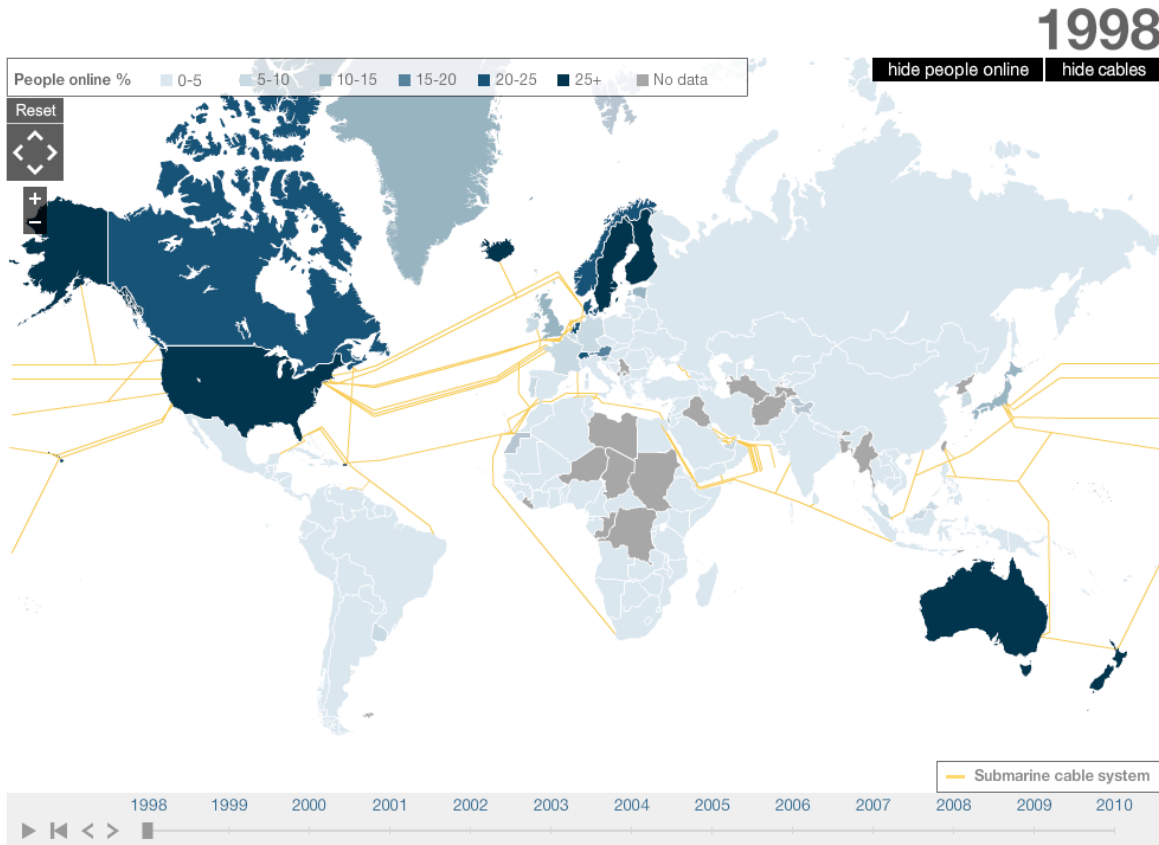
Linked to the eGranary's idea of compiling all the resources on a large hard drive, or the 'Internet-in-a-Box' concept, is the Community Information Platform that enables educators and institutions to add their own collections of resources. These collections can then be transferred to other eGranary collections. The majority of institutions using the eGranary pay at least USD1,200 per month per 1 Mb of data. Considering that a 10Mb line in North America costs approximately USD50, this would make the cost of Internet access about 300 times more expensive in Africa and other developing regions of the world compared to North America. When the low salaries of educators is taken into account, the possibility of educators making practical use of the Internet to source Open Educational Resources may be considered very minimal or not at all possible.

With an understanding of the continuing lack of Internet access to the majority of the world's learners and the high cost of access to find and download 'free' Open Educational Resources, we believe a project such as the eGranary could be the single most important vehicle to sharing OER across the developing world. The more data that can be stored on an eGranary, the less a learner, teacher or institution needs to use bandwidth. The cost of the eGranary itself and its updates will remain its main barrier to deployment.



Bandwidth to support OER

While much of the world has advanced dramatically in the expansion of the Internet, a few parts of the world have remained stubbornly behind. The BBC News Technology website provides an interactive map titled: [Broadband world: Connecting Africa](#)¹⁶⁵. This site shows that the parts of the world where Internet is available to the majority of populations in countries was extremely limited. Access to the Internet in the developing world and even Europe is shown as less than 5% of the populations.



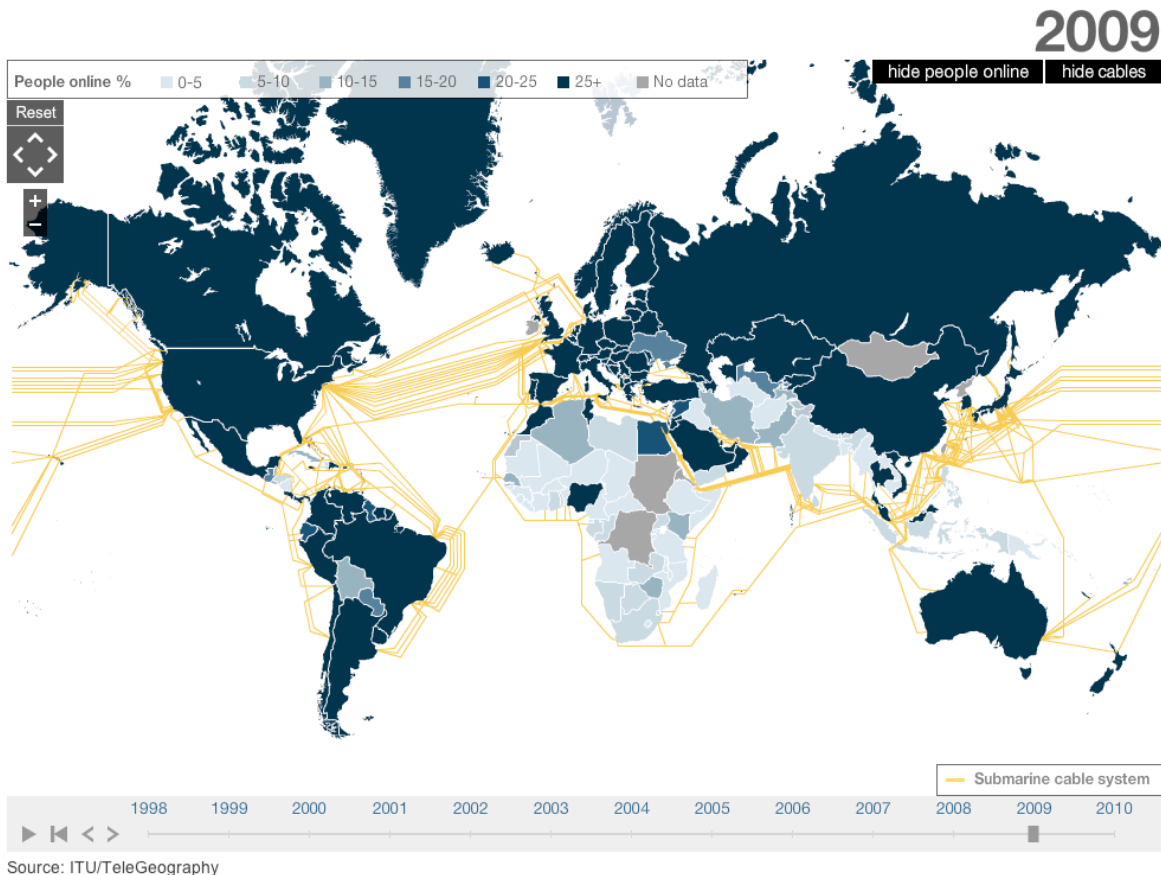
Source: ITU/TeleGeography

Figures correct at 1 December 2010. Country data for 2010 is yet to be published. Regional estimates are available [here](#).

Figure 5: Access to the Internet in 1998
(BBC News Technology, 2010)

The same site shows Internet access for much of the world as being over 25%, while most of Africa, parts of South and Southeast Asia as being under 5% of the population.

¹⁶⁵ <http://www.bbc.co.uk/news/technology-11864350>



Figures correct at 1 December 2010. Country data for 2010 is yet to be published. Regional estimates are available [here](#).

Figure 6: Access to the Internet in 2010
(BBC News Technology, 2010)

As seen below, the number of computers in the regions with the lowest bandwidth, also have a proportionately lower penetration of computers.

Media Statistics > Number of PCs (most recent) by country

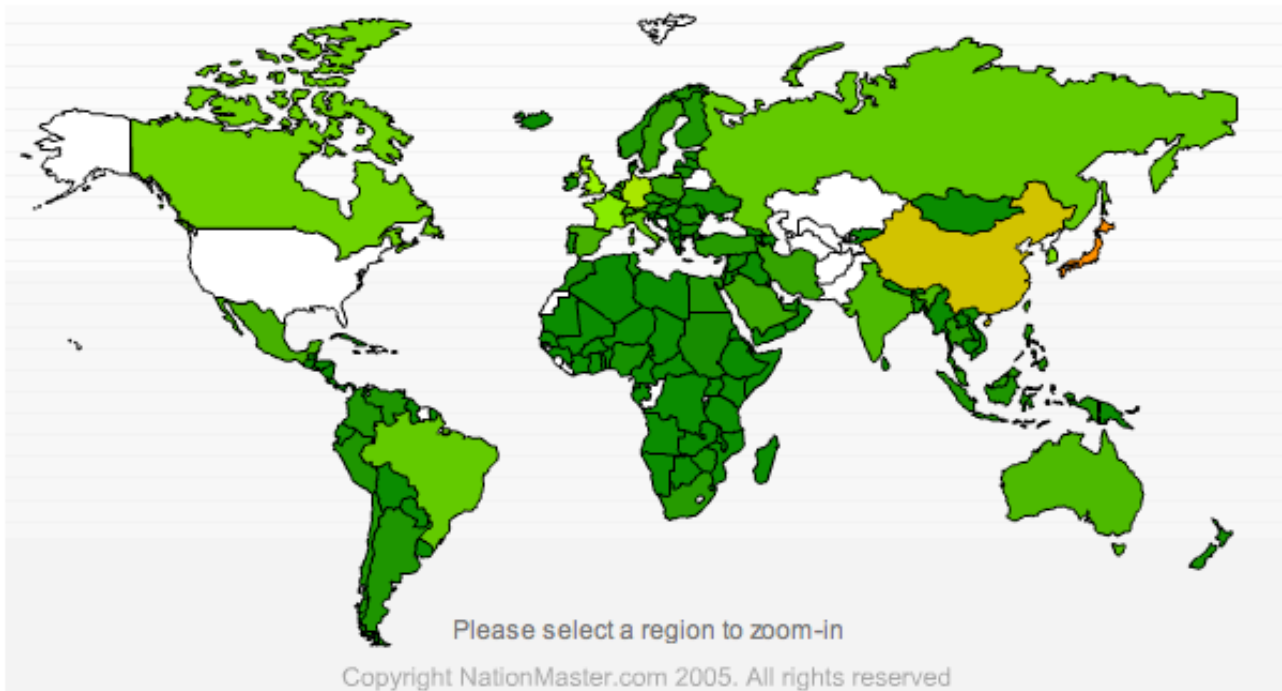
VIEW DATA: **Totals** Per capita Per \$ GDP

[Definition](#) [Source](#) [Printable version](#)

[Bar Graph](#) [Pie Chart](#) [Map](#) [Correlations](#)

Showing latest available data.

Click on a region to zoom in and then mouseover to view country names. [Show map full screen](#)



Legend: **Top** 69,200 **Middle** 3,245 **Bottom** 1 (No data)

Figure 7: Number of Computers by country
(NationMaster.com, 2010)

Education Statistics > Literacy > Total population (most recent) by country

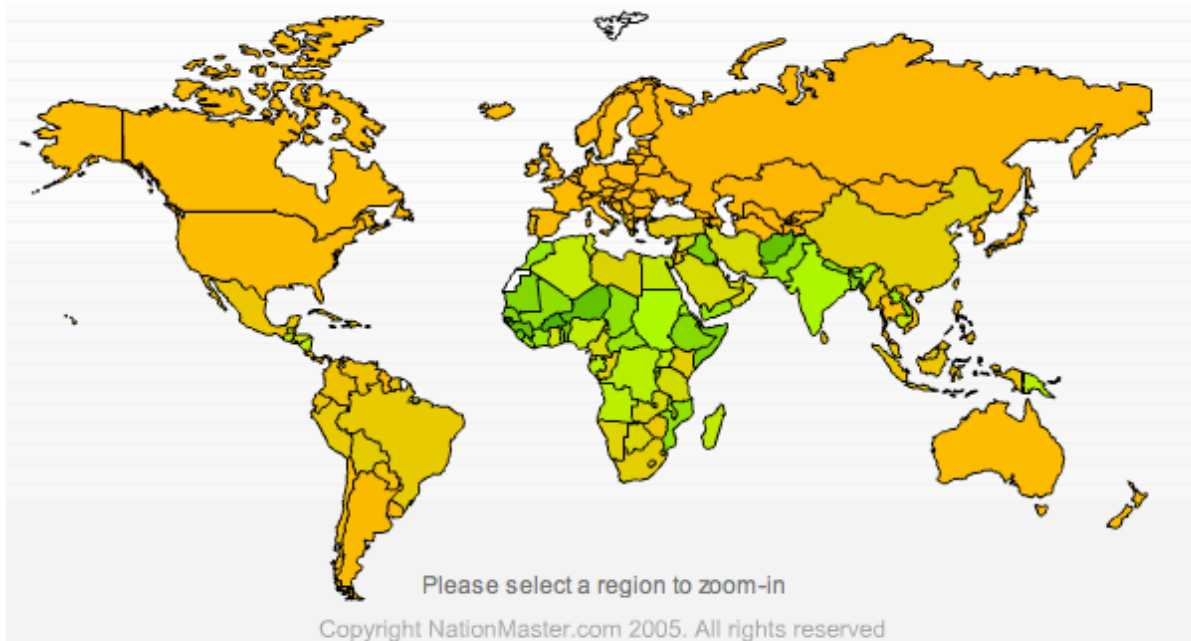
VIEW DATA: Totals

[Definition](#) [Source](#) [Printable version](#)

[Bar Graph](#) [Map](#)

Showing latest available data. Select another time period:

Click on a region to zoom in and then mouseover to view country names. [Show map full screen](#)



Legend: **Top** 100 **Middle** 84 **Bottom** 22 (No data)

Figure 8: Literacy rates by country
(NationMaster.com, 2010)

According to the statistics on the MIT Open Courseware site, only 1% of 103 million hits came from Sub-Saharan Africa, and 5% from North Africa. Again, this shows that the countries with the least bandwidth around the world made the least use of the free materials provided by one of the world's most prestigious institutions.

When one compares the literacy rates in these same regions with the available bandwidth, some consistent trend can be detected. Low bandwidth and low literacy rates appear to show a correlation.

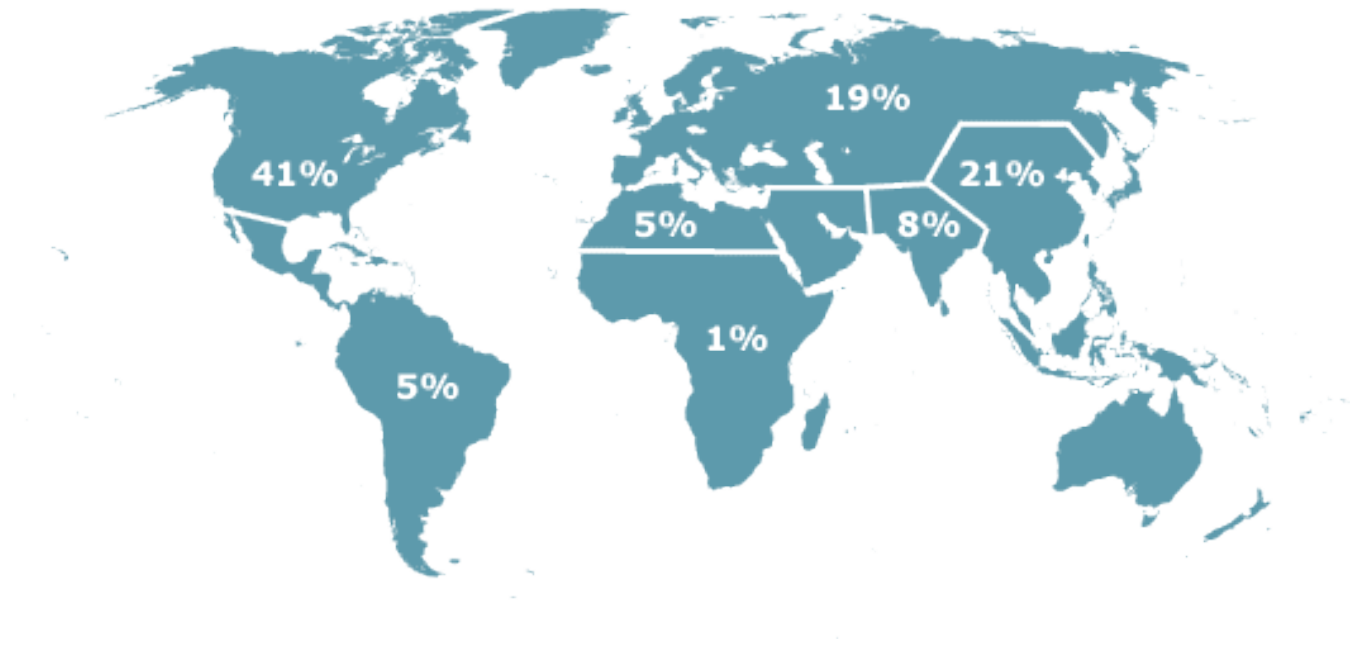


Figure 9: MIT OCW Visitors from all over the world
(MIT OpenCourseWare, 2010a)

In the regions most affected by lack of bandwidth, there also appears to be fewer computers, lower literacy levels, and lower indications of people using the online resources available to them. A range of factors appear to point to the hypothesis that where there is limited access to technology (bandwidth and computers), there is also less penetration of education, fewer teachers, lower literacy rates and a lower quality of life. This is an area in need of detailed analysis.



Equipment to support OER

Computers have for decades been debated about as a possible means to support and enrich learning. Numerous books can be found that make comparisons between classroom and online instruction (Russell, 2001). Only during the past 10 years or so has the emphasis moved from full-sized computers to portable, low cost computers and to the hand-held computer or cellphone.

The One-Laptop-Per-Child ([OLPC](#)¹⁶⁶) project appears to have spurred a whole industry of small, low cost computers (Daniel, 2010). Some of these, like the OLPC, were designed to ‘find each other’ and communicate in small, local networks, thereby supporting collaborative learning. Many of the cheapest of these machines have no Internet access and therefore cannot be used to surf the Internet or interact with a virtual science laboratory, even if the school, parent or learner had access. In the case of the OLPC, if the Internet is introduced into the local network through one or more machines, the whole group gains access to the Internet.

Many of the machines now called ‘[netbooks](#)¹⁶⁷’ do not even have the ability to network with other local machines. A [list of low cost devices](#)¹⁶⁸ is occasionally published by InfoDev at the World Bank, but one should be aware that lists like these remain out-of-date due to the rapidity of new machines being released (infoDev, 2010).

One form of computing device that has emerged over the past 10 years is the cellular phone that has morphed into a hand-held computer. While it may be argued that the majority of cellular devices are still ‘[2G](#)¹⁶⁹’, cellular companies are rapidly replacing devices in the market with more sophisticated models. Young people have become comfortable conversing and learning via mobile devices. Adults (e.g. teachers, education managers and policy-makers) may not be as used to the small devices as the younger generations and so may not see the potential of these devices that reach so many people in developing countries. [Jessica Colaço](#)¹⁷⁰ from Kenya describes herself as a Mobile Technology Evangelist and runs a [Twitter page](#) announcing projects she finds. Some adults may have difficulty conceptualizing education projects that depend on low cost hand-held devices or communal computers (such as ICT Centers) meeting the needs of younger people.

Computer laboratories, ICT centers, and community computer centers have been methods tested to help provide access to education and knowledge to more people who do not have their own personal computers. With cultures in many developing countries being more group or community oriented rather than individualistic and competitive, these sharable concepts have been well received, but there are often issues of management, equipment security, maintenance and project sustainability in the management of ICT Centers. Project sustainability could be a challenge because of the lack of business understanding and competition.

A novel idea for schools that have limited funding for computer equipment has been the [multiple mouse](#)¹⁷¹ concept from Microsoft (2010). Using one computer, up to 25 learners can each use a mouse and participate in educational games and programs on just one computer.

In Namibia, [SchoolNet Namibia](#)¹⁷² created a model of out-of-school youth being employed on a stipend to set up, install and maintain computer laboratories in schools. After having been employed by SchoolNet Namibia, these young people

¹⁶⁶ <http://laptop.org/en/>

¹⁶⁷ <http://en.wikipedia.org/wiki/Netbook>

¹⁶⁸ <http://www.infoDev.org/devices-list-update>

¹⁶⁹ <http://electronics.howstuffworks.com/cell-phone7.htm>

¹⁷⁰ <http://jessicolaco.wordpress.com/who-am-i/>

¹⁷¹ <http://www.microsoft.com/multipoint/mouse-mischief/en-us/how-to.aspx>

¹⁷² <http://www.schoolnet.na/>



would find their way into regular jobs. The website states: ‘At the peak of its achievements in early 2006, SchoolNet Namibia had a staff complement of some 23 highly dedicated young Namibians, leading the field in ICT development in education, reaching an estimated 150,000 Namibian learners and teachers with its open source technology solution and internet service, country-wide.’ (SchoolNet Namibia, 2010). Notwithstanding the success of this initiative to reach hundreds of schools in deep rural areas, many with no electricity and telephone services, the project was unable to remain sustainable. Funders were unable to maintain the annual expenses and the project was dissolved in favor of a new project run by government.

Sugata Mitra¹⁷³ became known as the ‘Hole-in-the-wall’ person because he took a touch-sensitive computer and cemented it into a wall for illiterate street kids to use in India. He describes in his many [presentations](#)¹⁷⁴, how young people who have no hope of entering a school are able to learn, even when they have not previously encountered the language of instruction and the alphabet in which the learning material is written. These experiments have been repeated in multiple countries and each time similar results are found. Young people who have no hope of entering a school can learn in small groups without a teacher. Some people even went so far as to call it ‘[minimally invasive education](#)¹⁷⁵’.

The hole-in-the-wall experiments were followed up by the Council for Science and Industrial Research (CSIR) in South Africa, where an ATM-like structure called the [Digital Doorway](#)¹⁷⁶ has been built to house the computers, which are installed in deep rural villages. These computers are communal machines, some with Internet access and many with only slow cellular links that enable the CSIR to monitor the machines and update the software (Meraka Institute, 2010).

Since findings are starting to show that a few hundred young people can gain computer literacy from one computer (Daniel, 2010), the OER movement needs to consider ways that shared computers in the poorest parts of the world can provide some form of education, where there is no hope of schools providing the traditional alternatives. [Open schools](#)¹⁷⁷ are also proving their worth, providing schooling to young people where there are no traditional alternatives (COL, 2010). The [Commonwealth of Learning](#)¹⁷⁸ in collaboration with the [William and Flora Hewlett Foundation](#)¹⁷⁹ and educators in 5 countries have produced some 20,000 pages of [free learning content](#)¹⁸⁰ for open schools.

The issue of access to computer equipment has not been resolved by any one project. Sustainability is often cited as a concern and ongoing sources of funding are needed. Donor funds may be secured to start up a project, but the operational, maintenance and replacement costs must then be built into regular education budgets. As reported by Sir John Daniel (Daniel, 2010), nearly 400 million children between the ages of 14 and 17 were not in secondary school in 2006. Concepts of providing one computer per child are completely beyond the financial capability of developing countries and other solutions must be found. Building schools for this number of children is impossible, as is accepting the consequences of continuing to leave these young people with few skills and inability to find work or generate self-employment.

¹⁷³ http://en.wikipedia.org/wiki/Sugata_Mitra

¹⁷⁴ <http://www.ted.com/search?q=sugata+mitra>

¹⁷⁵ http://en.wikipedia.org/wiki/Minimally_Invasive_Education

¹⁷⁶ <http://www.digitaldoorway.org.za>

¹⁷⁷ <http://www.col.org/openschooling>

¹⁷⁸ <http://www.col.org>

¹⁷⁹ <http://www.hewlett.org/>

¹⁸⁰ <http://www.hewlett.org/grants/6191>



Limited or absent bandwidth and access to computer equipment across the developing world remain the greatest barrier to education. While a number of projects stoically work toward producing curriculum content for all subjects at all levels, providing some form of access to the hundreds of millions of young people who have no hope of entering a school must be the next challenge. Since building sufficient conventional schools are not an option for governments, other alternatives are inevitable. The magnitude of the challenge to raise the developing world's education standards must be a critical element in future plans for OER.



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