

OPEN EDUCATIONAL RESOURCES: DEVELOPMENT AND EXPANSION IN AFRICA

Professor Sahr P. Thomas Gbamanja (GCOB)
Deputy Vice Chancellor,
Fourah Bay College,
University of Sierra Leone.

The clear mandates for universities, and other institutions of higher education in general are to do teaching, research and community service. These processes require the institutions to:-

- Provide appropriate curricula that are valid, significant and learnable.
- Provide appropriate delivery strategies.
- Conduct research and disseminate findings for decision making.
- Award relevant degrees and other credentials that are functional.
- Contribute to solving society's problems that may arise on a daily basis.

The knowledge explosion in recent times has compelled higher institutions of learning to be more analytic in trying to know how to disseminate knowledge to the learner and society at large. Traditional instructional strategies and methodologies have been enhanced by advances in Information and Communication Technology (ICT). The emergence of the internet and the opportunities it offers has also facilitated new educational delivery modes that make teaching learning more meaningful.

In 2001, the Massachusetts Institute of Technology (MIT) began its Open Courseware (OCW) initiative; making the vast majority of its instructional materials and courses available on-line. This escalated to immense release of teaching resources resulting in the formation of the Open Courseware Consortium (OCWC) that brought all 'stakeholders in this initiative together.

In 2002, the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the term "Open Educational Resources (OER) as a new educational delivery mode in all the nations of the world. In 2012, UNESCO made a declaration that followed a world-wide survey, calling all governments to make all educational materials freely available, (Mossley, 2013). This declaration and the initiative of OER are critical as higher institutions face immense challenges in meeting rising enrolment demands world-wide. Forecasts suggest that the current global enrolments of 165 million will grow by a further 98 million by 2025 (UNESCO and Commonwealth of Learning (2011 - 2015). UNESCO has also predicted that this growth is unlikely to be accompanied by equivalent increase in the human and financial resources available to the higher education sector. Yet, UNESCO has urged decision makers in governments and institutions to invest in the production, adaptation and use

of OER and to bring them into the mainstream of higher education in order to improve the quality of curricula and teaching and to reduce costs. This will not be easy for developing countries like Africa where access to hardware, software and connectivity are serious challenges. These challenges however should not overshadow the benefits of individualized study, networking and collaborative learning that will create opportunities for pedagogical innovation in:-

- Curricula development and instructional strategies;
- Course design;
- Development of appropriate teaching strategies and learning materials;
- Develop relevant evaluation tools for diverse environments; and
- Develop strategies for community involvement.

CEMCA (2013) has observed that OER initiatives are currently seen as a viable way forward for achieving education for all. It is observed that OER are now popular in Western countries and these are pro-actively produced by specialist educators and various institutions.

Knowledge is a public good and as such it should be disseminated and shared freely for the benefit of society as a whole (UNISA, 2014 - 2016). This is true, especially when the production of such knowledge has been funded by the public purse as do many universities that are subvented by their governments.

But we are also aware that many academics in Africa do not like sharing information. Some people hold on to whatever knowledge they possess so that they use it for upward mobility or promotion. But the idea behind the concept of OER is that knowledge, including all course materials and instructional strategies should be open, meaning that they should be free and available over the internet and they should have as few restrictions as possible for use. There should be little or no technological barriers, and there should be as few legal permission barriers as possible in terms of right and licensing restrictions for the end users.

Higher institutions in Africa need to embrace OER and ensure it is well implemented. In a study of art and humanities teachers participating in an OER training network, analysis and findings in data reveal that teachers' engagement with OER has the potential to provide enhanced teacher collaboration and curriculum development activities as well as information sharing about resources, practices, and teaching challenges (Petrides, L Jimes, C., Middleton-Detzner. C. et al.2010). It is reported that participants in the OER training network and engagement with OER did not only reduce teacher isolation, but also helped expand teachers' roles in collaborative learning, sharing information with one another.

Collaborative learning is very critical and necessary in our universities in Africa. This paper therefore will discuss the concept of OER fully, and present the opportunities and challenges that OER will offer in Africa.

What are Open Educational Resources?

The concept of OER is relatively new and has been defined in various ways by various authors. Thus, there is no one standard definition. However, the broad definition established by OER commons is widely acceptable by many authors. Simply put, it states that OER are teaching and learning materials that are freely available on-line for everyone to use, whether you are an instructor, student or self-learner.

These include course materials and designs, lecture notes, syllabus, textbooks, assessment modes, games simulations and all other pedagogical materials available in digital media for use and re-use (Aithem et al 2001. CEMOA (2013) defines OER as a technology enabled self-contained unit of self-assessable teaching with an explicit measurable learning objective, being at some point in time in digital electronic format and generally free of cost to use. It has an open license attached.

OER refers to electronic resources including those in multi-media formats and such materials are generally released under a creative commons or similar license that support open or nearly open use of content. These materials can be developed and made available by colleges and universities, libraries, government agencies, publishers or faculty members who are willing to share.

Hylen, J. states that OER refers to digitized materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research. He further clarifies this to include:-

- Learning Content: This includes all courses, modules, learning objectives, and other pedagogical collections.
- Tools: This includes software to support the development, use, re-use and content delivery modes and strategies,
- Implementation Resources: This includes intellectual property licenses to give some legal backing to the materials.

As already mentioned, the concept of OER is still in its infancy and thus the words "Open" , "Educational", and "Resources" still bear some ambiguity in the minds of authors. "Open" generally refers to affordable life long, effective, convenient, and available to every learner and teacher. Downes (2006) considers "'Open" as accessible, appropriate, accredited, and affordable, at no cost to the user of the resources.

The word "Educational" also poses some debate as to whether only materials produced with the intention of being used within formal educational institutions should be considered. OLCOS (2006), considers the word "Educational" to mean all materials actually used for teaching and learning, whether at formal or non-formal settings.

The term "Resources" also could refer to the type of materials available, or the media the resources. Resource types may refer to modules or courses, simulations, games, (animations, methodologies and strategies. On the other hand, resource media might radio, television, web pages on the internet or similar media.

Several of such OER resources exist worldwide. Wiley (2006) in Hylen, J. presents the blowing brief overview of OER movement in post-secondary education:-

- Over 150 universities in China participate in the China Open Resources For Education initiative, having over 450 courses on-line.
- Eleven top universities in France formed the Paris Tech OCW Project, offering 150 courses.
- Nine top universities in Japan are engaged in Japanese OCW Alliance offering 250 courses in Japanese and 100 in English.
- Seven universities in the United States of America offer large scale OER programmes. The universities are MIT, Rice, John's Hopkins, Tufts, Carnegie Mellon, and Utah State University.

Wiley reports that there are altogether 2000 freely available university courses currently on-line and more OER projects are emerging rapidly worldwide.

Development and Expansion of OER in Africa

Useful as Open Educational Resources are in teaching and learning, it is not easy to develop them and make them available especially in the Africa setting. In the first place many African Universities, especially those in West African countries do not have the needed funding to acquire the technologies required to prepare the resources or even maintain the necessary media required. Adequate funding of education is at a low degree and the challenges of power supply are key to grapple with. Furthermore, the worldwide pressures on teaching staff, the increasing ratio of staff to students and the lack of appropriate incentives for faculty to share or disseminate their work compound the problem of OER development. Another barrier to sharing knowledge and encouraging collaboration in African universities arises from the practice of rigid promotion criteria for upward mobility. Everyone wants to excel, and to excel, you need to publish or perish. Thus, many academics will prefer to keep information to themselves to enable them publish and earn promotion.

Most times, it is when academics get to the top senior ranks that they can afford to share knowledge, but this too is in the form of text books that can be sold to the learner or the public.

Various models of OER exist and more are still being innovated by institutions. One of such models is connexions (CNX) which operates as both a repository and web-publishing tool where users can search, view, develop and publish educational content. In allowing users assume roles such as editor, author and publisher, they form communities that produce content. CNX enables

collaboration and group authorship to contribute to existing information in the OER. Richmond (2006) also presents a model called "Educational Mash up" sites which allow content to flow from place to place so that users can easily pull and integrate content across multiple collections. There are also "meta-sites", which serve as a single point of entry across multiple collections and they allow educators and learners to impact educational resources with their experiences such as content, metadata and vocabulary. The University of South Africa (UNISA 2014 - 2016) adopted the business model which provides UNISA with a chance to engage with the opportunities to succeed economically and to provide effective support to students and their ability to provide intelligent assessment and critical feedback to the learners. The University of South Africa (UNISA) is an excellent model for Open Distant Learning (ODL), and thus has well established OER systems. UNISA's policy on ODL requires student centeredness whereby students are seen as the main foci of the educational process and they are supported and offered with the necessary environment to take progressive responsibility for their learning research. Through this, students develop independent and critical thinking.

UNISA adopts a very systematic integration of high quality available OER through the following procedures:-

- Stimulate and support change in practice through awareness. Challenging and changing people's perceptions and pedagogical approaches and practices.
- Encouraging and supporting institutional change through technical infrastructure, changing institutional processes and through the provision of extensive skills training.
- Developing guidelines for the production and structuring of course materials and timelines for implementation. Some policies could be modified in the process to provide for these new concepts.
- Developing quality guidelines for the use of OER.
- Adopting sustainable approaches by linking to existing or newly developed institutional systems, policies and strategies. (UNISA 2014 - 2016).

Individualized instructional materials like OER need to be well designed. The generally practiced design especially for print module contains the components noted below:-

- i. Introduction: This provides the assumptions made in writing the module, e.g. the philosophical approach, the background to the materials, and attributes of the audience for which the module is designed. It should also present succinctly the importance of the information to be presented.
- ii. Objectives: This presents to the learners the tasks they will accomplish and it should emphasize the application, analysis and

- evaluation of knowledge and skills to be accomplished,
- iii. Pretest: This is used to pre-screen the learners who will use the module, and to provide feedback to the author for modification if need be.
- iv. Directions: These provide instruction on how to proceed in learning the module.
- v. Explanatory Texts: These contain information that is entailed in each objective. Here the author needs to explain key words or phrases, presents reading materials and key examples of knowledge presented.
- vi. Learning Activities: These are designed to provide learners with the opportunity to practice and apply the new knowledge and skills learnt.
- vii. Suggested Answers: These are model answers that assist the learner to compare his answers to see if he is on the right track,
- vii. Summaries: Here you review the main concepts and ideas in the module,
- ix. References: This will be a list of all materials cited such as books, articles and the like,
- x. Further Readings: These are suggested resources such as articles, books or internal materials that the learner may wish to refer to.
- xi. Assignments: These give the learner the opportunity to apply the information they have learned especially as a form of evaluation of work done.

In addition to the procedures and designs for materials, the relevant intellectual property strategies, repository site policies and evaluation strategies and policies will be considered and adopted.

The University of Sierra Leone Experience:

Due to the Ebola epidemic in Sierra Leone, the University of Sierra Leone decided to engage its students on some alternative learning mode (ALM). These include uploading lecture notes on the website, burning of lecture notes on CDs/DVDs, provision of hard copies to students, and radio programmes.

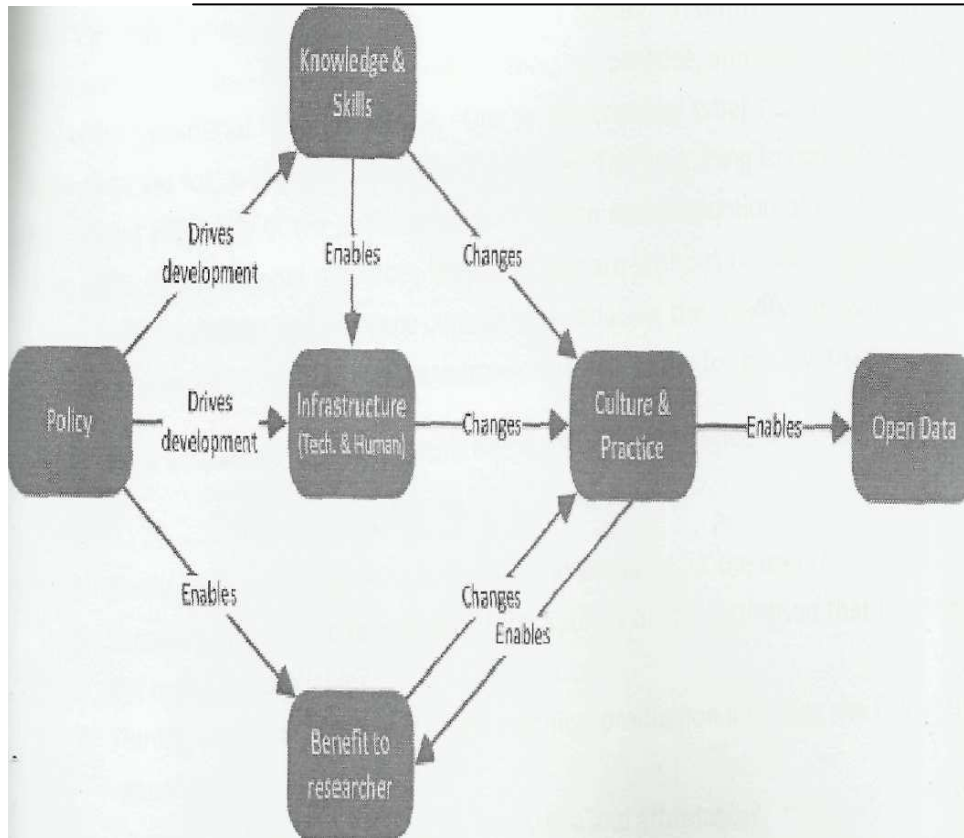
A monitoring and steering committee was formed to ensure the successful implementation of the ALM. Some of the decisions and strategies were:-

- i. To ensure that the ICT Directorate organize workshops for all the academic faculty members in the university,
- ii. Equipment provided for the implementation of the Alternative Learning Mode (ALM).
- iii. A two day workshop conducted for all Deans and ICT staff.
- iv. Deans to ensure that all their academic staff word processed their lecture notes and follow the required format.
- v. A team of four per college in the multiplying of lecture notes.
- vi. Quality Assurance team internally within the respective faculties to check

- lecture notes from lecturers.
- vii. Exams Directorate to provide list of students that were registered and their current levels.
- viii. Sierra Leone Association of Non-Governmental Organizations (SLANGO) to collect some hard copies of lecture notes and help to distribute them nationwide.
- ix. SLANGO should also collect electronic copies of
- x. Lecture notes on five external drives.
- xi. Lecturers after approval from their internal quality
- xii. Assurance to ensure that these notes were emailed to their respective students.
- xiii. Burning of CDs/DVDs followed.

These moves where necessary contingency measures to assist our students at home since all educational institutions were closed for several months and indeed some of the students found themselves in quarantine areas. This is the kind of crucial situation that African countries have to expect and the necessary action to take.

The diagram below illustrates the elements required for opening data and how these come together to create the desired effect.



Source: *Helping to open up. Research Information and Digital Literacies Coalition (2013)*

Quality Assurance in Open Educational Resources

Quality is defined in various ways by authors, and also depending on the circumstance and the object or event that is being assessed for quality. In terms of OER quality can be considered in two dimensions, namely; Fitness for purpose, and cost efficiency, that could be considered in OER progress. One would consider what the purpose of the resources are for, and to serve for whose purpose. The next thing to consider broadly is the cost efficiency of the entire process of design and production of the resources. The value of educational resources tends to decrease without periodic updating and many open resources are not kept current thus reducing the quality. In some cases, faculty resistance to opening their resources causes obstacles for quality assurance.

The quality of learning resources generally is usually determined using the following criteria:-

- Firstly, how accurate are the processes and products for the users?
- Secondly, what is the reputation of the authors or the institution that is making the resources available?
- Thirdly, what is the standard of the technical production including the IT and the repository?
- Fourthly, are the resources easily accessible and affordable?

Answers to these questions will indicate fitness for purpose. When we adopt fitness for purpose as the overriding concern for defining the quality of an OER, then we must focus on the learning achieved by the learners who use the OER. CEMOA (2013) gives five domains of learning focusing on achieved learning by the learners and which cover all learning educational objectives.

These domains of learning include:-

- i. Cognitive Domain of Learning: This deals with the subject content of the material that makes up the OER.
- ii. Affective Domain: Is the OER interesting and makes learning as fun for the student?
- iii. Met a cognitive: This deals with the efficacy of the built-in self-assessment mechanisms for the learner.
- iv. Environment Domain: This deals with the accessibility and localization of the resources,
- v. Management Domain: This deals with the discoverability.

These five domains and their respective coverage are summarized below (CEMCA 2013):-

- i. Cognitive Domain: The content knowledge, content skills and reflective critical thinking skills to be learnt, general pedagogy,
- ii. Affective Domain: The motivations, attitude and decision to motivate performance, learner independence and autonomy,
- iii. Metacognitive Domain: Understanding how the task is performed, and the ability to self-monitor, evaluate and plan own future learning,
- iv. Environment Domain: The localization, artistic presentation language, multimedia, interactivity, and embedded links to other content,
- v. Management Domain: Discoverability, tagging, includes for time management transmissibility, business models.

Quality can also be ensured if prospective authors review their materials such as lesson plans, syllabus, notes and other materials, and then encourage peer review processes. The rationale for the content, the pedagogical procedures, the IT and multimedia to be used should be considered critically for quality OER.

Opportunities and Challenges for OER in Africa

The benefits of OER in teaching and learning are enormous. But the main benefits are that they promote pedagogical innovation and relevance that avoids teaching from the text book. Secondly, it provides quality alternative means of learning different from textbooks that may not be affordable to the learner. This points to some views that OER will soon be so popular that all the components of an education will be available on-line for free.

Furthermore, OER is a way to address the rising costs of education, and they have the potential to facilitate new modes of teaching and learning. Faculty members will have the ability and enablement to pick and choose individual resources they want to use. They can also modify specific resources and organize them in unique ways that provide greater diversity of learning environments for students.

The principle of allowing adaptation of materials provides one mechanism amongst many for constructing roles for students as active participants in the instructional process, who learn best by doing and creating new ideas or knowledge especially from prior knowledge, not just by passive reading and absorbing. Content that encourages activity and construction or creation by students through use and re-use and adaptation of content can make a significant contribution to creating more effective learning environments and skills. This is what the principle of "Constructivism" is built upon, that is, the ability of the learner to use his frame of reference or prior learning to adapt new knowledge by building or constructing his own knowledge. This goes hand-in-hand with the principle of "Connectivism", which involves learning through connecting or using several sources to make own sense. OER enables access and collaboration by learners.

Challenges

Although OER has all these benefits and opportunities for accessing, use and re-use privileges that encourage collaborative learning, it is still faced with challenges especially in Africa. Faculty members would not want to share their own content; or re-use other's material for creating content collaboratively. The issue of infrastructure including IT equipment and material and the dearth of qualified staff to design and produce relevant information for OER pose more problems especially when it comes to the practice of producing quality OER content and design appropriate for individualistic learning.

Sustainability is another critical issue to consider as a challenge. It is not just about sustaining OER in repositories, but about embedding process and transforming practices to support on-going OER production and release. It involves funding for institutions or individuals to produce funding to release, manage and support OER. Most universities in Africa are subvented and they suffer from underfunding by governments. Funds for research are also inadequate if they are available.

Technical and pedagogical accessibility of OER are crucial characteristics of OER. Presenting OER through different hosting mechanisms can improve accessibility. Thus, familiarity with various sites and repositories becomes imperative.

Legal Aspects of OER

The production and management of OER requires consideration for Intellectual Property Rights (IPR) especially copyright. Making materials 'Open' means availability to public domain for free or at least with limited restrictions. Other legal issues to be considered include data protection laws, liability for inaccuracy or illegal content. Copyright is the right to control the copying and dissemination of some other person's original work. Intellectual Property Right (IPR) is a generic term that relates to copyright, trademarks, patents and other claims for 'ownership' of a resource or content whether, registered or unregistered. Restrictions or legal issues regarding IPR can be barriers to OER. But OER generally and technically, may or may not allow commercial re-distribution and content can be either in the public domain or under an Open License like one of the Creative Commons Licenses, which allow anyone to re-use the document under certain conditions.

Some types of licenses are:-

1. Creative Commons (CC) License (II versions).
2. GNU Free Document License.
3. Open Content License.
4. Open Publication License.

Creative Commons (CC) is the most prominent and it is an internationally recognized non-profit organization that provides definitions, tools, and advice to creators of on-line materials regarding the use of their work by others. Creative Commons provides 'Course or module authors with free tools to manage their intellectual property.

As presented above, OER is useful in educational practice in the contemporary world. Because it has many challenges especially for higher education in Africa, it needs all lends on deck. It requires some impute from various

stakeholders which will now be presented as guidelines as published by UNESCO and Commonwealth of Learning (2015).

Guidelines for Governments:-

Governments throughout Africa occupy a significant role in the life of higher education institutions for the fact that they provide the larger funding for these institutions. Apart from the subventions they provide, governments in many countries also make policies that guide the operations of the institutions. It is therefore, expedient that governments are involved in decision making and production and management of OER.

Specifically, UNESCO and Commonwealth of Learning, (2011, 2015) suggest that governments:-

- a. Support the use of OER through their policy making role in higher education.
- b. Consider adopting open licensing frameworks.
- c. Contribute to raising awareness of key OER issues.
- d. Promote rational ICT/connectivity strategies.
- e. Support the sustainability and distribution of quality learning materials.

Guidelines for Higher Education Institutions:-

Higher education institutions need to support their teaching staff in developing quality teaching and learning environments for the learner. The general mandates of higher education institutions as mentioned earlier in this paper are teaching, research, and community service. Thus, identifying and developing learning resources and pedagogy are all integral parts of the process. Thus, institutions should be encouraged to create OER and be able to network through collaborative ventures.

Specifically, they should:-

- a. Develop institutional strategies for adapting OER.
- b. Provide incentives to support investment in the development, acquisition and adaptation of high quality learning materials.
- c. Recognize the important role of educational resources within the internal quality assurance process.
- d. Consider creating flexible copyright policies.
- e. Undertake institutional advocacy and capacity building.
- f. Ensure ICT access for staff and students.
- g. Develop policies and practices to store and access OER and these should be reviewed periodically.

Guidelines for Academic Staff:-

Academic staffs are pivotal in the instructional process as they are vital in ensuring that quality teaching and learning take place in the institution. It is said that 'if the student has not learnt the teacher has not taught'. This is because academic staffs are central to the teaching and learning experiences of the learner.

As already indicated earlier in this paper, academic staffs in Africa are faced with more challenges than their counterparts elsewhere.

The following guidelines should therefore; be considered and examined to assist them in implementing OER.

- a. Academic staff should develop skills to evaluate OER in various repositories before use or re-use.
- b. They should develop the habit of working in teams to publish quality material for OER.
- c. They should seek institutional support for OER skills development.
- d. They should promote OER through publishing about OER.
- e. They must be au fait with knowledge about IPR, copyright and privacy policies.

Guidelines for Accreditation Bodies:

Quality Assurance and Accreditation of Higher Education Institutions in many countries is done by special agents or bodies set aside by government. For example, in Nigeria, the National Universities Commission (NUC).

It gives oversight to all higher education institutions in the country; and in Sierra Leone, it is the Tertiary Education Commission (TEC) that does this oversight. Other countries have theirs also. These agents normally periodically monitor and assess the quality of the curricula, the instructional processes and infrastructure, and other mechanisms that assist them evaluate and give recognition or accreditation as the case may be.

In this vein, these quality assurance agents should:-

- a. Develop better understanding of OER and how it impacts quality assurance.
- b. Organize symposium on OER and the implications for copyright.
- c. Encourage government to increase funding of education especially to enable academic staff to produce materials for OER.

Some important OER Repositories:

There are many OER repositories all over the world. Just a few are presented below for perusal.

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NAME	SITE
OER Commons	www.oercommons.org

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Open Course Ware Consortium	www.ocwconsortium.org/use/use.dynamic.html
Namibian College of Open Learning (NAMCOL)	www.namcol.com.na
Botswana College of Open and Distance Learning (BOCODOL)	www.bocodol.ac.bw
Commonwealth of Learning (COL)	www.col.org/OER
Carnegie Mellon University, Open Learning Initiative	http://oli.web.cmu.edu/openlearning
Kwame Nkrumah, University of Science and Technology	http://web.knusi.edu.gh/oer
MIT OpenCourseWare Massachusetts, Institute of Technology	http://ocw.mit.edu
Open Learn (The Open University UK)	http://openlearn.open.ac.uk/course
Open Learning Initiative	http://oli.web.cmu.edu/openlearning
University of California, Berkley	http://webcast.berkeley.edu
University of California, Irvine	http://B31//ocw.ucl.edu/B39
China Open Resources for Education (CORE)	www, core, org.cn/cn/ipkc/index_en.html
Japan Open courseware Consortium	www.jocw.jp
UNESCO OER Community	http://oerwiki.iiep.unesco.org
Open Education News	http://openeducationnews

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Open Education - Free Education For All	www.openeducation.net
NAME	SITE
OLCOS, (Open eLearning Content Observatory Services)	www.olcos.org .
Commonwealth of Learning , (COL) Course Material	www.col.org/courseMaterials
Professional Education Organisation International(PEOL)	www.peoi.org

Conclusions

The knowledge explosion in recent times has compelled higher institutions of learning to introduce new strategies in executing their mandates of teaching, research and community service. New instructional methods and strategies have been introduced to facilitate effective delivery of quality knowledge to the learner and society.

Open Educational Resources (OER) provide one of such delivery modes that have emerged in recent times. OER are teaching and learning materials that are freely available online for everyone to use and re-use. The initiative started at the MIT with the development of Open Courseware (OCW) making the vast majority of its instructional materials and courses available online.

We are in a world of IT and the internet provides enormous learning tools. Academic staff of higher institutions should be encouraged to be well au fait with OER and they should be urged to not only deposit their materials on OER repositories but should be encouraged to use and re-use OER. African governments are encouraged to support higher institutions in their countries to develop OER. In a world where Open Distance Learning (ODL) and other individualized teaching and learning modes are becoming the order of the day, OER becomes an imperative in the educational enterprise.

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