United Nations
Educational, Scientific and
Cultural Organization

COMMONWEALTH *of* LEARNING

PERSPECTIVES ON OPEN AND DISTANCE LEARNING

Open Educational Resources and Change in Higher Education:

Reflections from Practice

Jenny Glennie, Ken Harley, Neil Butcher and Trudi van Wyk, Editors

Published by Commonwealth of Learning, Vancouver, 2012

The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to encourage the development and sharing of open learning and distance education knowledge, resources and technologies.

Commonwealth of Learning, 2012

© 2012 by the Commonwealth of Learning. 'PERSPECTIVES ON OPEN AND DISTANCE LEARNING: Open Educational Resources and Change in Higher Education: Reflections from Practice' is made available under a Creative Commons Attribution 3.0 License (international): http://creativecommons.org/licenses/by/3.0

For the avoidance of doubt, by applying this license the Commonwealth of Learning does not waive any privileges or immunities from claims that it may be entitled to assert, nor does the Commonwealth of Learning submit itself to the jurisdiction, courts, legal processes or laws of any jurisdiction.

PERSPECTIVES ON OPEN AND DISTANCE LEARNING: Open Educational Resources and Change in Higher Education: Reflections from Practice

ISBN 978-1-894975-53-7

Editors: Jenny Glennie, Ken Harley, Neil Butcher and Trudi van Wyk

Published by:

Commonwealth of Learning

1055 West Hastings, Suite 1200
Vancouver, British Columbia
Canada V6E 2E9

Telephone: +1 604 775 8200
Fax: +1 604 775 8210
Web: www.col.org
E-mail: info@col.org

United Nations Educational, Scientific and Cultural Organization
Section for Higher Education

7, place de Fontenoy
75352 PARIS 07 SP
France

Telephone: +33 1 45 68 10 00
Fax: +33 1 45 68 56 32
Web: www.unesco.org/education
E-mail: l.ruas@unesco.org

Contents

Foreword v

Acknowledgements vii

Contributors ix

List of Acronyms xxi

Introduction
Discourses in the Development of OER Practice and Policy 1
Jenny Glennie, Ken Harley and Neil Butcher

Chapter 1
Taking OER Beyond the OER Community: Policy Issues and Priorities 13
Trudi van Wyk

Chapter 2
Introducing the Opportunities and Challenges of OER: The Case of the Commonwealth of Independent States and the Baltic States 27
Dendev Badarch, Svetlana Knyazeva and Andy Lane

Chapter 3
Tracing the Trajectory of OER in India: Reflections on Three Initiatives 41
V. Bharathi Harishankar

Chapter 4
Producing OER from Scratch: The Case of Health Sciences at the University of Ghana and the Kwame Nkrumah University of Science and Technology 57
Kathleen Ludewig Omollo, Adam Rahman and Chris Andrew Yebuah

Chapter 5
Collaborative Materials Design, Adaptation and Take-Up: A Case Study of a South African Mathematics Teacher Education OER Project 75
Ingrid Sapire, Yvonne Reed and Tessa Welch

Chapter 6
OER Production and Adaptation through Networking across Sub-Saharan Africa: Learning from TESSA 91
Freda Wolfenden

Vignette: Teacher Education in Sub-Saharan Africa 107
Catherine Ngugi

Chapter 7
Integrating OER into Open Educational Practices 111
Gráinne Conole

Chapter 8
Finding Relevant OER in Higher Education: A Personal Account 125
Lisbeth Levey

Chapter 9
Design and Development of OER: A Student Perspective 141
Andy Lane

Chapter 10
Pedagogical Content Knowledge in Higher Education and Open Educational Resources: A Case Study on Course Design.....155
Heather Kanuka and Geneviève Gauthier

Vignette: The Virtual University for Small States of the Commonwealth (VUSSC): OER within a Transnational Qualifications Framework 169
John T. Lesperance

Chapter 11
Experiences in Finding and Using OER in Teacher Education Programmes: Pedagogical Approach and Challenges.....173
John Arul Phillips

Vignette: Teaching with Technology: A Personal Journey 187
Edward P. Rybicki

Vignette: OER and Teaching Occupational and Environmental Health at the Post-Graduate Level to Medical Practitioners at the University of Cape Town.....193
Jonathan E. Myers

Chapter 12
Sharing Existing Teaching Materials as OER: Key Considerations from Practice.....199
Monica Mawoyo and Neil Butcher

Chapter 13
Experiences of Developing OER-Amenable Policies.....217
Sarah Hoosen and Neil Butcher

Chapter 14
From Apples to Legislation: OER Policy in Brazil 241
Carolina Rossini

Chapter 15
Opening Education in New Zealand: A Snapshot of a Rapidly Evolving OER Ecosystem 263
Wayne Mackintosh

Conclusion
Reflections on Practice.....283
Jenny Glennie, Ken Harley and Neil Butcher

CHAPTER

4

Producing OER from Scratch: The Case of Health Sciences at the University of Ghana and the Kwame Nkrumah University of Science and Technology

Kathleen Ludewig Omollo, Adam Rahman and Chris Andrew Yebuah

Abstract

This chapter looks at the production and promotion of health open educational resources (OER) at the University of Ghana (UG) and Kwame Nkrumah University of Science and Technology (KNUST). Both institutions initially chose to produce materials from scratch rather than build upon existing OER, and then subsequently shared the materials through a global distribution network to advance health education across the continent. Their aim was to use OER to offset the challenges of an ever-increasing number of students, inadequate faculty size, insufficient funding for educational materials and equipment, limited physical and technical infrastructure, curriculum gaps and low research capacity. To create and publicly share educational materials, both universities undertook a number of activities to strengthen their professional, policy and technological infrastructures. Participants discussed the importance of clear copyright ownership and informed consent policies, the skills required to produce OER, incentives for authors, and ways to ensure efficiency of production as well as good quality in the materials produced. In the OER production processes that emerged, health science lecturers develop the educational content, but OER media specialists assist with photos, videos and sound, and employ basic instructional design principles to package effective learning materials. The OER are shared through multiple distribution methods for ease of access across the universities, the continent and the world. KNUST and UG have demonstrated that it is possible for resource-constrained African institutions to create effective, world-class electronic learning modules that are relevant to their needs and also beneficial to other universities.

Keywords: *capacity-building, copyright clearance, electronic learning, health education, instructional design, materials development, skills development*

Introduction

The Kwame Nkrumah University of Science and Technology (KNUST, est. 1952) and the University of Ghana (UG, est. 1948) are the two largest public universities in Ghana, with 23,000 and 30,000 students, respectively. Their associated Colleges of Health Sciences (CHS) are responsible for training many of the healthcare workers in Ghana. In 2008, both universities introduced open educational resources (OER) projects to enhance health science instruction.

Their many accomplishments of the past three years include raising awareness of OER within CHS, developing processes, skills and structures to support the creation of OER by lecturers and support staff, producing media-rich interactive OER modules, introducing their students to OER, and using and adapting OER from other institutions. Additionally, both universities proposed modifications to academic practices and official policies to promote publishing Creative Commons (CC)-licensed content such as OER.

KNUST and UG provide noteworthy models of (i) motivations for creating and adapting OER, (ii) how to develop capacity to locally produce OER, (iii) advocacy tactics for ideological and financial support for OER across large, diverse colleges and universities and (iv) progression and vision in OER to complement other delivery methods for education.

This chapter is derived from semi-structured interviews with staff, lecturers and students involved in OER activities at KNUST and UG. The interviewees gave their consent for the authors to use their names and direct quotations.

Background

The OER activities at KNUST and UG emerged in 2008, when both universities were partners in a number of cross-institutional grants and workshops.

KNUST and UG were introduced to OER during a May 2008 workshop in Accra. The workshop included 27 participants from six other African universities and institutes, three foundations and the University of Michigan (U-M), who gathered to discuss the relevance and potential of OER to improve health education in Sub-Saharan Africa. Later in 2008, KNUST and UG entered into a two-year partnership with U-M, the Ghana Ministry of Health, and the Bill & Melinda Gates Foundation to strengthen human resources for health education and healthcare professionals in medicine, nursing and public health.

The following year, The William and Flora Hewlett Foundation sponsored a pilot activity to develop health OER through collaboration amongst several universities that participated in the May workshop: KNUST, UG, University of Cape Town, University of the Western Cape and U-M, as well as OER Africa, an initiative of the South African Institute for Distance Education (Saide). In late 2009, the partner institutions submitted a successful two-year, follow-on grant proposal. The follow-on grant launched an African Health OER Network, with the aim to advance health education across the continent by using OER developed by and targeted towards Africans in order to share knowledge, address curriculum gaps and support communities around health education.

Motivations for OER

Kwame Nkrumah University of Science and Technology

KNUST expects that its engagement with OER will facilitate ongoing curriculum renewal, enhance the teaching and learning experiences of students and educators, promote knowledge sharing and raise the institution's global visibility. The ambition is that OER will help — at least in part — to offset the challenges of an ever-increasing number of students; inadequate faculty size; insufficient funding for educational materials, equipment and financial constraints; limited physical and technical infrastructure; and low research capacity.

> *We struggle to have access to information. If we have information, why do we not also share it as part of a pool of universities? Using OER, our institutions are able to exchange information for the purpose of improved learning.*
>
> *Peter Donkor, Pro Vice-Chancellor and former Provost of CHS, KNUST*

University of Ghana

Leadership within UG and its CHS views OER as a tool to achieve the strategic objectives of the college and the university at large. Within CHS, one aim of OER is to promote standardisation of clinical practices. OER enables faculty to preview how a topic is taught at other institutions and make comparisons with local methods. It also encourages conversations around how various instructors may conduct clinical or laboratory procedures differently within an institution. Such transparency enables opportunities for curriculum analysis, which may facilitate standardisation within and across institutions.

> *What will happen when this is done is that it will tend to standardise things and the students will understand or grasp that this is what they will be expected to know.*
>
> *Nii Armah Adu-Aryee, general surgeon and clinical instructor, UG*

At UG, the vast majority of the university's courses — and currently all health science courses — are taught face-to-face, but a small subset of courses is taught through distance education, either paper-based or online. UG plans to expand distance education to cover half of all enrolled students.

> *The university has a target that at least half of its population will be taking courses outside of campuses, and it has a vision of providing rich content electronically for its students. So OER provides a great opportunity for the university to achieve that end.*
>
> *Patrick Kuti, webmaster, ICT Directorate, UG*

Grand Vision

One long-term goal common to both universities is to increase the number of healthcare workers. Sub-Saharan Africa has the lowest percentage of the global healthcare workforce and the lowest relative health expenditures, yet has one of

the highest percentages of global disease burden. Like many Sub-Saharan African countries, Ghana struggles with low doctor-to-patient ratios. There are only 0.15 doctors and 0.92 nurses per 1,000 Ghanaians, which is well below the World Health Organization (WHO) recommendation of 2.0 doctors and 2.5 nurses. Ghana ranks amongst the lowest for healthcare worker density and amongst the highest in overall mortality. To improve public health, the Ghanaian government aims to triple the number of healthcare workers. However, the medical schools in Ghana can only admit 30 per cent of qualified applicants due to limited faculty size.

A key barrier in growing and strengthening the national workforce of health professionals is the lack of instructors to teach basic and clinical sciences, which is complicated by the duplication of effort in developing learning materials. The aim is that OER will, in the long term, reduce the faculty time and cost required to produce teaching materials or present lectures.

> *Something produced in Zimbabwe may be useful to some of us in Ghana, and vice versa, and it will cut down significantly on cost. We shouldn't feel isolated at our universities by trying to do everything and cover all topics on our own. We should fight a unified battle in producing things.*
>
> *Richard Phillips, lecturer, Department of Internal Medicine, KNUST*

Time saved on materials development can then be re-apportioned for more dynamic, interactive learning activities with students (such as discussions, laboratory experiments or clinical demonstrations), or instead for publications or professional development for lecturers. For example, one professor of molecular medicine at KNUST estimates that once he completes his module for lipid metabolism, he will be able to reduce his lecture time on the topic from six hours to four.

Rationale for Producing Local OER

When OER was introduced to KNUST and UG in 2008, there was already a small but growing collection of OER produced by other universities and available for anyone, worldwide, to use or adapt. Both universities, however, chose to focus their initial OER activities on promoting local creation of OER, often from scratch, instead of using existing OER or even existing materials developed by faculty. Several factors informed this decision.

Lack of Existing, Relevant OER

At the start of the project in 2008, there were few health OER — and even fewer materials produced by Africans. Many of the existing resources created outside Africa were not viewed as suitable for local contexts. More recently, though, there have been a few examples of using OER from elsewhere. For example, two lecturers at the UG dental school have used OER from U-M, Johns Hopkins University, and the Global Health Informatics Partnership as part of their teaching and research.

Lack of Contextually Appropriate Materials in General

One motivation for creating OER was to fill a gap in existing educational materials — both proprietary and open. The most common medical textbooks used

worldwide are predominantly Western and therefore feature Western practices and scenarios. This means that the books may promote different processes, have different cultural influences, and rely more heavily on expensive tests and equipment to guide diagnoses, compared to how those same topics would be taught by Ghanaian health professionals.

> *Most of the medical textbooks are written by people in the USA. There are only a few from our country. You read the things they are doing, which are advanced [and high-tech] things, here in Korle Bu, but we don't [and can't] do that here. So the fact that the videos actually involve our lecturers who are telling us what they [are doing] here in Korle Bu, is a good thing.*
>
> *third-year clinical student, Medical School, UG*

Additionally, those textbooks often use images of Caucasian patients, which may occasionally be problematic. For example, certain dermatological diseases may manifest themselves differently in dark skin compared to light skin. By creating and sharing their own materials, Ghanaian lecturers are able to develop and gain access to more contextually appropriate teaching resources.

> *When you look in textbooks, it's difficult to find African cases. The cases may be pretty similar but sometimes there is something that you see on a white skin so nicely and [it is] very easy to pick up, but on the dark skin it has a different manifestation that may be difficult to see. Sometimes it is difficult for the students to appreciate when they see a clinical case that involves an African.*
>
> *Richard Phillips, lecturer, Department of Internal Medicine, KNUST*

Simulating In-Person Demonstrations that Are Difficult to See in Large Classes

Both universities had nascent eLearning activities prior to engaging with OER, but many lecturers still relied on low-tech delivery methods, such as paper notes, dry-erase boards and PowerPoint slides. Consequently, the primary goal of OER was to create materials for students where often there previously had been none. For example, beginning in 2011, both KNUST and UG started to experiment with adapting existing materials for OER. At KNUST, one OER narrated lecture in dentistry was based on existing PowerPoint slides. KNUST's Department of Communication Design is in the process of revising a maternal health flipbook, created by a former student for publication as an OER. Some of the basic sciences and internal medicine OER modules in progress at UG are loosely based on existing lecture slides.

Most importantly, open licensing enables lecturers to make materials readily available to current students by giving them permission to copy and share with their peers, and by ensuring that materials are accessible to students outside the classroom and even after they finish their courses.

> *We are not doing OER for the benefit of people outside of KNUST, primarily, even though we see that as a secondary benefit. Having my lecture material readily available to students, 24 hours a day, seven days a week, means that they can even read or watch it before they come to meet me in the lecture room. Therefore, they will probably ask the right questions, if they've read it. After the lecture, if there is something they do not*

understand, I expect that they'll be able to refer back to my materials and go over them again.

Peter Donkor, Pro Vice-Chancellor and former Provost of CHS, KNUST

Likewise, one of the reasons for creating OER anew was to codify local practices by local professors as a back-up for the limited in-person, faculty-student discussions caused by high faculty-student ratios, overflowing classrooms and crowded clinical demonstrations.

[With OER,] patient privacy is, in a way, preserved. [As a patient,] I wouldn't feel comfortable having 20 students around me. [As a lecturer,] you want to document [rare conditions] so you can show your students without having to go back to the patient over and over again.

Sandra Hewlett, lecturer, Dental School, UG

Showcasing Specialised Knowledge

One U-M final-year medical student remarked that his peers who do part of their clinical rotations abroad often return to Michigan with more confidence in their ability to diagnose, because they have learned to rely on their knowledge and on simpler equipment. Aware of their unique expertise, CHS instructional staff members aspire to share this specialised knowledge with their students and their global peers. For example, one physician from KNUST is a renowned expert on Buruli ulcer, an infection most common in Sub-Saharan Africa, and consults on the topic for WHO. He developed a Buruli ulcer instructional module — which he also licensed as an OER — for the WHO.

This motivation to demonstrate unique expertise has been especially strong amongst senior faculty in the UG Medical School. These senior faculty view OER as a method for imparting their wisdom to the next generation of doctors and for bequeathing their teaching legacy to the school through video. Several retired faculty who now serve as part-time consultants for UG have been authors for OER modules at U-G.

We have a number of old professors in the system … who are so enthusiastic about OER production that a lot of them have produced some material. This is very good because of their experience in teaching students over such a long time.

Aaron Lawson, Provost, CHS, UG

Developing Socio-Technical Infrastructure to Support Local Production of OER

To create educational materials that they were comfortable sharing publicly, the two universities undertook a number of activities to strengthen professional, policy and technological infrastructures. During the workshops that followed, participants discussed the importance of clear copyright ownership and informed consent policies, skills required to produce OER, incentives for faculty to participate, and processes to ensure efficiency of production and quality of the materials produced.

Copyright

At KNUST and UG, the universities own the copyright to materials produced by teaching and support staff. Consequently, each university needed to revisit institutional policies to clarify that lecturers have the authority to publish and license materials, including under a CC license, on behalf of the university. Additionally, many staff and students were unaware of basic principles of copyright law. Piracy is common amongst students because within Ghana there is a low risk of being held accountable for copyright infringement. Since the materials shared as OER would be shared publicly, worldwide, in countries with stronger copyright enforcement, training was essential to reinforce with content authors the importance of adherence to copyright laws. Basic training in copyright, CC licensing and copyright clearance was therefore needed to explain the advantages of sharing content under the "some rights reserved" designation, as opposed to the default of "all rights reserved".

Informed Consent

Each institution chose to focus its OER production on clinical videos and laboratory procedures, since those are the most difficult to see up close in large classes. Many clinical videos require filming of patients; in those cases, obtaining informed consent and upholding patient privacy are essential. KNUST and UG each have affiliated teaching hospitals, and it is expected that large groups of students will be shadowing physicians on ward rounds. However, at the outset of the projects, neither the hospitals nor the universities had consent forms or even informal accepted standards that would permit patient recordings for any use other than internal viewing amongst hospital staff. Each university had to develop new practices for informed consent and to explicitly request permission to record procedures.

At KNUST, lecturers usually obtain oral permission from patients for recordings. Many physicians at Komfo Anokye Teaching Hospital (KATH) have commented that written consent would not be culturally acceptable, because in the Kumasi area it is extremely rare for people to sign forms, except in unusually weighty circumstances such as when purchasing land. They have found that patients agree to participate when the background and permission information is discussed orally, but if the same information is presented in a written form for signature, it is met with more suspicion. KNUST is currently exploring how to adapt UG's patient consent process for OER so that it can be used at KATH.

At Korle Bu Teaching Hospital (KBTH) in UG, physicians opted to create a formal, written consent form for patients to sign. UG physicians have generally found that patients are willing to be recorded and to sign the permission form. In some circumstances, however, patient consent has been solicited orally due to literacy barriers. As at KATH, physicians at KBTH also have encountered some patients who, when presented with a document to sign, deemed written consent to be too serious an action and insisted on giving only oral permission. At KBTH, several patients opted out of recording altogether.

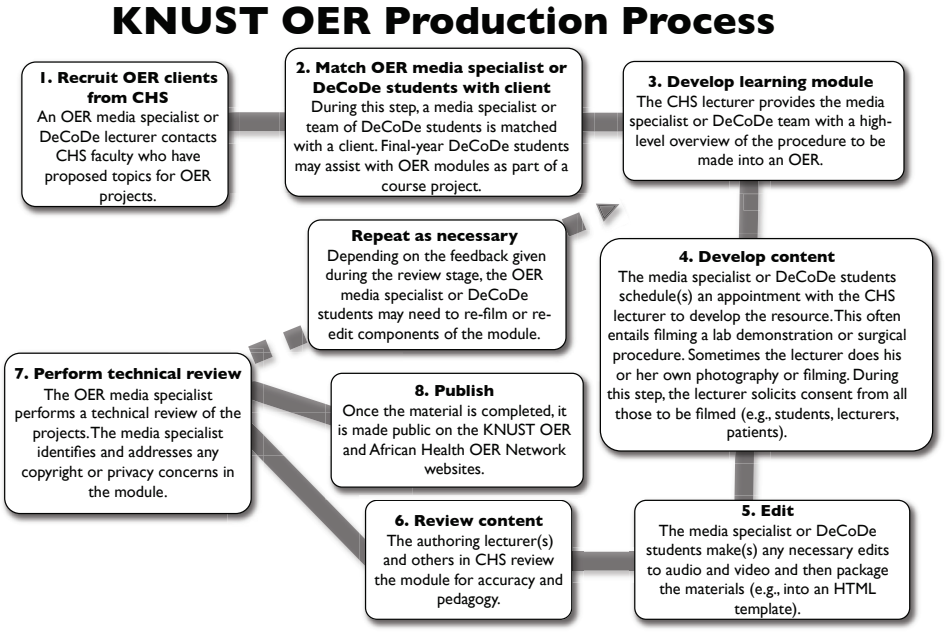
Skills and Equipment for Electronic Learning

Each university had to address the challenges of marshalling human resources and mobilising, or in some cases developing, the technical skills and physical infrastructure needed to produce media-rich electronic learning materials. To facilitate access to OER and other electronic resources, in 2009 and 2010 both KNUST and UG made substantial investments to improve their information and communication technology (ICT) infrastructure, including their bandwidth capacities.

Doctors can provide content, but they do not possess acute technological skills. Training doctors to be experts in multimedia production would be an expensive and inefficient use of their time. Thus, both universities have sought alternatives to relieve the CHS faculty of having to do both content development and technical production.

At KNUST in early 2009, the health OER co-ordinator was introduced to a lecturer in the Department of Communication Design (DeCoDe) within the College of Arts and Social Sciences. The two agreed that the photography, video editing and web design expertise of DeCoDe would be great assets for OER production. In late 2009, CHS and DeCoDe explored having recent graduates and teams of enrolled students work with lecturers to co-develop OER. In the OER production process that has emerged (Figure 4.1), CHS faculty still develop the educational content, but an OER media specialist or team of DeCoDe students assists with photos, videos, sound and packaging for the learning modules.

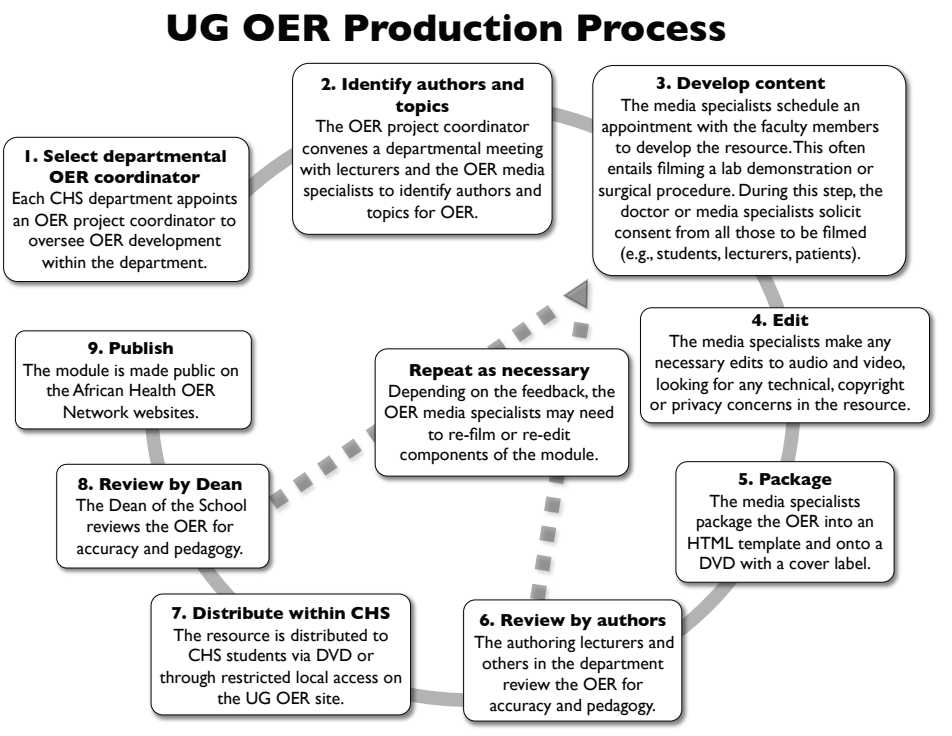
Figure 4.1: KNUST OER production process



The relationship with DeCoDe continues to grow, with two paid media specialists as well as 20 to 30 third- and fourth-year students and select faculty now involved in multimedia production for OER.

UG adopted a similar approach (Figure 4.2). In January 2010, the OER co-ordinator at CHS decided to hire a media specialist who had worked in the commercial film and television industry in Accra, to provide professional media support for OER. In the following two years, UG hired two additional full-time media specialists to support OER.

Figure 4.2: University of Ghana OER production process



At both institutions, lecturers seem grateful to have the technical support offered by media specialists. Due to the involvement of the author(s) in the design phase and again during the review stages — which may be repeated as needed — academics are able to maintain ownership of the content to ensure quality and accuracy. All contributing authors must sign off on materials before they are made publicly available.

Policy Support for Open Publishing

As is the tradition in many universities, faculty performance evaluation at UG and KNUST was originally based largely on publication in high-impact, proprietary, peer-reviewed scholarly journals. Each institution had to introduce formal and informal incentives for lecturers to devote their time to developing OER. For lecturers to be willing to take time away from their other teaching, research and service responsibilities so as to create targeted eLearning materials (which was a new concept for many), the university had to offer some recognition or reward.

I think that if a university adopts a policy specifically for the development of OER in that institution, it will be a giant starting point. That way they won't depend on the willingness and desire of faculty because the faculty would know from the beginning that their inputs will be recognised by the statutes of the university and they would get the appropriate credit for that activity.

Ohene Opare-Sem, Professor of Internal Medicine, KNUST

In 2009, the OER teams at the two universities each established a small committee of lecturers, support staff and librarians to examine existing university policies regarding intellectual property and performance reviews. The committees drafted two new policies and began the process of moving these through three committees at different levels of the university administration. Both policies reaffirm the universities' copyright to materials produced by teaching and support staff, but establish the CC Attribution (CC BY) license as the default for all OER, whilst giving authoring faculty the right to select an alternative CC license.

At UG, the OER policy efforts coincided with the university's regular policy reviews, which are conducted every three years. The draft policy proposes the creation of a production unit for OER, staffed by technology professionals, and a server to host the completed OER. Lastly, it suggests that OER be reviewed by contributing departments prior to publication, that faculty get time earmarked for creating OER and that authoring faculty receive academic recognition for their OER. At the time of this writing, the draft policy is with the academic board, in its third and final stage of approval.

Open educational resource material produced by faculty members should be seen as intellectual products which count towards career advancement. It is recommended that three OER materials be considered equivalent to a peer-reviewed publication. However, this equivalence ratio should be guided by the level of complexity of the material produced ... a faculty member should not be promoted solely on the production of OER material in lieu of peer-reviewed publications.

excerpt from UG draft OER policy

At KNUST, the OER policy establishes a reward structure for OER production. It proposes that faculty receive the same credit for OER modules as for peer-reviewed publications, and that the university allocate time for faculty to create OER. The policy recommends that the university continue to seek external funding for this work, and also encourages departments within CHS to earmark within their budgets some funds for OER production. The policy was approved in August 2010 and made public in May 2011. As the policy states:

The purpose of this OER Policy is to:

- Guide the development and review of OER materials prior to sharing them on a worldwide scale.
- Clarify publication rights and licensing issues.
- Outline policies regarding the use of required infrastructure (information technology, libraries, etc.) and other support services.

- Identify human and other resources to support faculty in developing OER for teaching and learning.
- Define collaborations within and outside of the university and the intent to allow access. (KNUST, 2011, p.6)

Achievements

Completed and Published OER Modules

When originally presented with examples of OER in 2008, several CHS faculty at KNUST and UG were intimidated by the level of technical sophistication and by the content-clearing process. A few even questioned their own abilities to produce such materials. Both institutions have now demonstrated that it is possible for their lecturers and support staff to produce high-calibre, media-rich, interactive learning materials.

> *I think the greatest achievement has just been the fact that we have shown that this thing can be done. The students are using the materials and find them helpful. But the biggest thing is just overcoming that barrier of, "Can we really produce such things?" And now the answer is clearly "yes".*
>
> *Richard Adanu, Vice Dean, School of Public Health, UG*

To date, KNUST has completed 15 OER modules, which have been posted on the KNUST OER site. Another 21 are currently in development. At UG, lecturers at the medical school have authored comprehensive learning modules for the four basic clinical examinations (obstetrics and gynaecology, internal medicine, surgery and paediatrics), whilst additional modules for dentistry, community health and internal medicine are currently in progress.

Distributed OER to Students

In a small 2009 pilot study, one UG professor distributed a module on total abdominal hysterectomy to 19 final-year medical students. The following year, the same professor distributed four obstetrics and gynaecology OER modules on CD to 80 second-year medical students. In 2010, two dental lecturers loaded several OER videos from U-M onto the computers in the Dental School student computer laboratory. In 2011, two professors distributed the surgery and gynaecology clinical examination modules to all 180 second-year medical students.

At KNUST in 2010, one professor showed videos from his obstetrics examination module to students during class. Another professor mentioned his automated blood cell count module in class, and directed students to the KNUST OER website. Some other students also accessed other modules from the KNUST OER website: the glucose tolerance test, laboratory methods for clinical microbiology, and the mental state examination. One KNUST student interviewed had learned of the Caesarean section and of clinical examinations from surgery OER modules provided by a friend at UG Medical School. Recently, a professor of pharmacology at KNUST has projected several laboratory demonstration videos, in the background of his laboratory sessions, on the same topics.

Based on four focus groups and on surveys conducted at each institution between 2009 and 2011, students have given largely positive feedback on OER, finding it to be a useful complement to classroom instruction. Some students at KNUST offered rough estimates of the understanding gained from having instructional materials readily available in digital formats. One student remarked that the video for polymerase chain reactions, "a very difficult concept", helped him to "now understand it very well". Another student offered that the OER material on the mental state examination improved her understanding of the topic by 90 per cent, and the material on the automated blood count by 50 per cent. A different KNUST student said that, for some topics, having a video or animation could improve understanding up to 300 per cent, because the concepts are hard to visualise based on lectures alone or are too difficult to see during ward rounds.

Increased Awareness of and Support for OER on Campus

Many of the early participants in OER at KNUST and UG have now become advocates for OER. Those who have created OER are keen to produce additional modules. At KNUST, support for OER has spread across CHS, with gradual growth of awareness in other colleges within the university. At UG, several lecturers in the CHS have been inspired to create their own OER after seeing the initial materials developed.

Some students have also come to see OER as a way to supplement their classroom learning. However, few interviewed students understood that the learning modules given to them by their instructors were openly licensed, and that they were allowed — and even encouraged — to copy, share, adapt and redistribute them. Many interviewed students agreed that having educational materials created by their own lecturers was very beneficial and assisted them in preparing for clinical examinations.

> *[Having OER produced by your own lecturer] can sometimes be a bit interesting in the sense that when you have issues with anything he says in the video, you can always go back and question him or her about it. But if our lecturers are not [creating OER for particular topics], then there is no problem bringing it from outside.*
>
> *anonymous 2011 MD graduate, KNUST*

But students also deemed educational materials produced from other institutions to be valuable, as these could reveal both important similarities and variations in techniques. For example, UG medical students who were given the obstetrics examination module produced by KNUST remarked that, even though it had been authored by a lecturer at another institution, the material was for the most part relevant to them. In that particular module, there was only a small difference (in one step) in how it was covered at KNUST versus at UG.

Introduced Instructional Design Principles into OER

In August 2010, a DeCoDe lecturer from KNUST completed a six-month research fellowship at U-M to study instructional and interactive design principles. Following his fellowship, he proposed that the KNUST OER adopt a RADDIE

approach — Research, Analysis, Design, Development, Implementation and Evaluation — for the packaging of media-rich and effective OER. The introduction of the RADDIE model has fostered discussions around quality assurance for health OER lesson modules. Although the RADDIE model is yet to be fully implemented at KNUST, its initial exploration has resulted in an enabling atmosphere that emphasises monitoring of quality and pedagogy within the OER production process.

Exchanged Knowledge Between Institutions and Regions

The free sharing of materials as OER, and in particular the consortium of universities involved in the African Health OER Network, led to the exchange of educational materials and other tacit knowledge between KNUST, UG and other universities. Specifically, it has facilitated multidirectional knowledge sharing between individuals and universities in the Global North (i.e., "developed countries") and those in the Global South (i.e., "developing countries").

North–South

Two U-M staff were able to spend extended periods at KNUST and UG for onsite collaboration in OER training, production and awareness. One professor spent a year-long sabbatical at KNUST in 2008–2009, with occasional trips to UG. He also returned for a one-month follow-up visit in September 2010. A technology project manager from the U-M OER team was at KNUST and UG for two months in 2009 and has made annual follow-up visits since then. Through onsite consultations, the two were able to share lessons learned from the OER activities at U-M as well as other aspects of education at U-M.

South–North

Upon return from his sabbatical, the aforementioned U-M professor used the Buruli ulcer module and two polymerase chain reaction animations in his internal medicine and microbiology classes at U-M in 2009–2010. The obstetrics and gynaecology modules developed by KNUST and UG have also been added as supplemental materials for the reproductive health sequence at U-M. Staff members at U-M have also learned additional techniques for video and audio editing, and additional instructional design skills that they have incorporated into OER activities at U-M. In particular, U-M had, for convenience, previously focussed on static resources like syllabi and PowerPoint lectures, but was inspired by KNUST and UG to put more effort into media-rich resources such as narrated lectures.

South–South

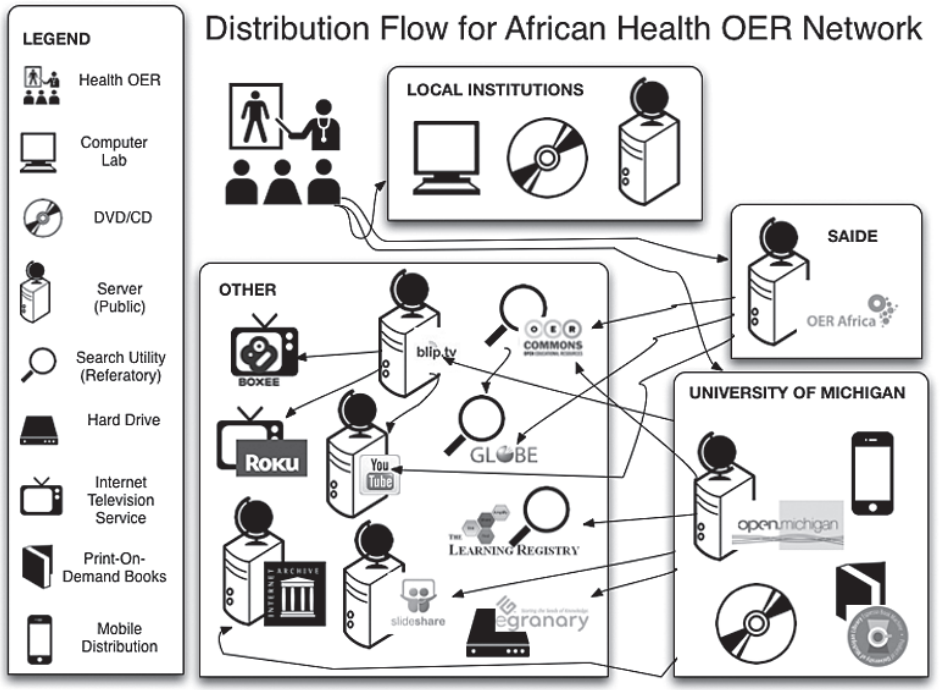
The OER developed by UG and KNUST has been used in other African countries. In April 2011, U-M demonstrated the Caesarean section module co-developed by UG and U-M to the Minister of Health of Ethiopia, who immediately distributed it to several community healthcare workers upon his return. The module co-author from UG is now advising on how to integrate OER into clinical maternal health education at a new medical school in Ethiopia. Additionally, two UG alumni happened across the total abdominal hysterectomy and Caesarean section modules from UG whilst doing online searches, and have since used them with fellow residents in Nigeria.

As previously noted, there has also been occasional exchange of OER between KNUST and UG. Since late 2010, U-M has facilitated health OER technology conference calls every other month with African Health OER Network participants. In October 2011, a number of Ghanaian and U-M participants were able to convene in Kumasi for a two-day joint workshop on OER production and support. This workshop sparked conversations around more co-ordinated OER efforts between the Ghanaian institutions.

South–North–South

The OER produced by KNUST and UG are shared through multiple distribution methods for ease of OER access across the university, the continent and the world. OER produced through the African Health OER Network is distributed through various offline and online channels, as Figure 4.3 illustrates.

Figure 4.3: Distribution flow for the African Health OER Network



(Server icon public domain, http://clker.com; all other icons — excluding trademarks — are public domain or CC BY, from http://thenounproject.com)

By posting the videos on mainstream websites like YouTube, the OER produced by KNUST and UG has received global recognition. In the past 11 months, the laboratory methods for the clinical microbiology module have been viewed nearly 150,000 times on YouTube, with two videos being viewed over 40,000 times each. The videos have been viewed across Africa, North and South America, Asia and Europe, with the most views in South Africa, Sudan, India, Brazil and the USA. The videos have received many positive ratings and comments, such as: "Many thanks for this simple yet excellent video explaining PCR and RT [real-time]-PCR."

Conclusion

KNUST and UG have demonstrated that it is possible for resource-constrained African institutions to create effective, world-class electronic learning models that are relevant to their students' needs and also beneficial to other universities. Using adjectives such as "innovative", "transformative", "collaborative" and "cost-effective", interviewees at UG and KNUST reaffirmed their belief in the potential benefits of openness, and encouraged other institutions to join the global OER movement. Both institutions view OER as a means to streamline health education, not as an end in itself.

> *[OER] allows exchange of knowledge between different institutions. When I watched the [UG] Legon [OER] videos, it gave me a new perspective on some of those examinations because there were things they said which our [instructors] probably didn't say, and in their phrases and language. So I think it's helpful to package the videos or distribute them in such a way that the students from different universities can have a video from other universities as well.*
>
> *anonymous 2011 MD graduate, KNUST*

Over the past three years, both institutions have undertaken significant changes in policy and skills development to support the creation of openly licensed materials. These changes required creativity, flexible cross-departmental co-ordination, and realignment of certain resources within the institutions.

Financial sustainability is a concern for many institutions that produce OER. This is especially true at KNUST and UG, where internal funds are already constrained and OER activities to date have been largely funded by external grants. In addition to their OER policies, each university has taken actions to incorporate OER into the main health science education activities on campus. For example, all of the media specialists at UG are general media specialists who assist with other ICT activities, not just OER. Two of the UG media specialists are roughly half grant-funded, with the other media specialist doing a one-year volunteer internship. KNUST is able to keep salary costs low by pairing OER authors and media specialists with student volunteers in DeCoDe who provide multimedia support as part of class projects. Both institutions plan to include an OER clause in future health education grants that include materials development. KNUST has already implemented this approach with a new emergency medicine education partnership funded by the U.S. National Institutes of Health. UG has taken a similar approach in an HIV/AIDS education project with Brown University.

References

Adanu, R. A., Adu-Sarkodie, Y., Opare-Sem, O., Nkyekyer, K., Donkor, P., Lawson, A., & Engleberg, N. C. (2010). Electronic learning and open educational resources in the health sciences in Ghana. *Ghana Medical Journal, 44*(4), 159–162. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3052833

Anderson, F. W., Mutchnick, I., Kwawukume, E. Y., Danso, K. A., Klufio, C. A., Clinton, Y. Yun, L. L., & Johnson, T. R. (2007). Who will be there when

women deliver? Assuring retention of obstetric providers. *Obstetrics and Gynecology, 110*(5), 1012–1016. doi: 10.1097/01.AOG.0000287064.63051.1c

Donkor, P. (2011). Developing and using open educational resources at KNUST. Retrieved from https://edutechdebate.org/digital-learning-resources/developing-and-using-open-educational-resources-at-knust

Hanss, T., Butcher, N., & Ngugi, C. (2009). 2010–2011 African Health OER Network Proposal to Hewlett Foundation Education Program — Open educational resources priority. Retrieved from https://open.umich.edu/wiki/images/7/71/20091009UM-OERAfricaHewlett2010HealthOER-proposal-public.pdf

Harley, K. (2010). Health OER inter-institutional project formative evaluation of health OER design phase. Retrieved from http://open.umich.edu/education/med/oernetwork/reports/formative-evaluation/2009

Harley, K. (2011). Phase 2 evaluation of the African Health OER Network: Consolidation and sustainability. Retrieved from http://open.umich.edu/education/med/oernetwork/reports/phase-2-health-oer-eval/2011

Hoosen, S. (2010). Guide to gaining ethical consent from patients for content released as OER. Retrieved from http://open.umich.edu/education/med/oernetwork/guides/ethical-consent-guide/2010

KNUST. (2011). Policy for development and use of Open Educational Resources (OER). Retrieved from http://knust.edu.gh/pages/sections.php?siteid=knust&mid=14&sid=94&id=776.

KNUST. (2012). Open educational resources. Retrieved from http://web.knust.edu.gh/oer

Omollo, K. L. (2011a). Growing an institutional health OER Initiative: A case study of the Kwame Nkrumah University of Science and Technology. Retrieved from http://open.umich.edu/education/med/oernetwork/reports/case-study-knust/2011

Omollo, K. L. (2011b). Growing an institutional health OER initiative: A case study of the University of Ghana. Retrieved from http://open.umich.edu/education/med/oernetwork/reports/case-study-ug/2011

Omollo, K. L. (2011c). Information and communication technology infrastructure analysis of Kwame Nkrumah University of Science and Technology and University of Ghana. Retrieved from http://hdl.handle.net/2027.42/85731

Omollo, K. L., Engleberg, N. C. Yebuah, C. A., et al. (2009–2011). Ghana OER video interviews. Retrieved from http://www.youtube.com/playlist?list=PLF4EC45F2B54D6112

Rahman, A. (2011). KNUST OER instructional design framework. Retrieved from http://www.youtube.com/watch?v=-fGBoacMRxE

Saide & University of Michigan. (2010–2012). African Health OER Network. Retrieved from http://www.oerafrica.org/healthoer

Tagoe, N., Donkor, P., Adanu, R., Opare-Sem, O., Engleberg, N., & Lawson, A. (2010). Beyond the first steps: Sustaining health OER initiatives in Ghana.

Open Ed 2010 Conference, 2–4 November 2010, Barcelona. Retrieved from http://hdl.handle.net/10609/4849

University of Ghana. (2011). Consent to participate in production of audiovisual teaching material for health education. Retrieved from http://open.umich.edu/education/med/oernetwork/guides/ug-consent-form/2011

University of Michigan. (2008). The Ghana-Michigan Collaborative Health Alliance For Reshaping Training, Education & Research (CHARTER). Retrieved from http://www.globalhealth.umich.edu/Charter.html

University of Michigan. (2011a). dScribe. Retrieved from http://open.umich.edu/dScribe

University of Michigan. (2011b). Guidelines for sharing recordings. Retrieved from http://open.umich.edu/share/share/guidelines-sharing-recordings

World Health Organization. (2006). *Working together for health: The world health report 2006*. WHO Publications: Geneva.