OER
OPEN EDUCATIONAL RESOURCES

This is the public version of the 2009 Health OER Design Phase Proposal. For more information, please contact Ted Hanss at ted@umich.edu

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Public description of your project

The University of Michigan, OER Africa, and four African university partners will develop a long term logic model and scalable, sustainable, collaborative content development programs for comprehensive, open, health professions curricula.

Proposal Summary

The inadequate density and distribution of health care providers negatively affects health outcomes around the globe. In Africa in particular, too few health care professionals are being trained to meet local needs.[1] A key barrier in both developed and developing countries is the lack of instructor capacity to teach both basic and clinical sciences, complicated by the duplication of effort in developing learning materials that can be shared as open educational resources (OER).

In 2008, Michigan used a Hewlett Foundation planning grant to hold a successful workshop and follow-up campus meetings. We now propose a one year effort to develop a sustainable and scalable OER program to support health education, particularly in developing countries. This effort will be a collaboration among the University of Michigan, OER Africa, Kwame Nkrumah University of Science and Technology, the University of Ghana, the University of Cape Town, and the University of the Western Cape.

In this design phase we will:

1. Engage university leadership in implementing institutional policy frameworks that facilitate the success of OER.
2. Hold faculty development workshops to build institutional capacity in OER.
3. Enhance an innovative, low-cost, and scalable process (dScribe) for converting educational materials into OER.
4. Collaboratively develop educational materials as OER and deploy them in our respective curricula.
5. Promote the collaboration and its outputs through a community of practice web site.
6. Establish a framework for a longitudinal study of faculty productivity and the effect of OER on learning outcomes and provide feedback on socio-technical aspects of collaborative OER practices.
7. Produce an evidence-based long-term logic model for Health OER based on a vision that multiple stakeholders will own, in which funders will invest, and which institutions are committed to sustaining. This consensus-driven model will be the basis of a Global Health OER follow-on proposal.

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[1] World Health Organization. Working Together for Health: The World Health Report 2006. WHO Publications: Geneva. 2006.

SECTION 2. PROPOSAL NARRATIVE

Name of Organization: Regents of the University of Michigan
Program Unit within Organization: Medical School Administration

A. Background

The University of Michigan
The University of Michigan (U-M) has a strong tradition of leadership in health science education. The University of Michigan established the first school of scientific medicine on the western frontier in 1850 and quickly became a leading producer of both practitioners and faculty members for other medical schools. Other health sciences programs were established in the late 19th Century and early 20th Century, leading to the university's current complement of programs in Medicine, Public Health, Nursing, Dentistry, Pharmacy, Kinesiology and Social Work.

Michigan has one of the world's great research libraries, with extensive holdings in the health sciences. The university has long been an innovator, with a history of leadership in the exploitation of technology to improve learning. In partnership with Google, the University Library is transforming scholarship by putting its entire holdings of more than seven million volumes on-line. In addition to these resources, the University is home to its pioneering School of Information (SI), one of the world's leading programs of research and instruction in the emerging information professions, with special expertise in the development of support for global collaboration.

Michigan's first course management system, Coursetools, became the base of Sakai, and Michigan leadership helped guide the Sakai Project. Sakai is one of the most important initiatives in the application of IT to the transformation of education and learning. Supported by both the Hewlett and Mellon Foundations, Sakai has grown to a community of practice of over 150 institutions of higher education who participate as full contributors to the development and core code for the project.

Michigan's health professions schools are deeply involved in issues of global health. The Medical School's Global REACH office has as its mission facilitating international research, education and collaboration for the benefit of faculty, students, and our global partners. The School of Public Health has a long tradition of engagement in global health. Dental School leadership participated in the 2007 *DentEd World Congress* that culminated with the founding of the International Federation of Dental Educators and Associations (IFDEA). The president and provost of the university, with the health sciences deans supporting, have committed to developing a Center for Global Health, and the search for its inaugural director is well underway.

The University of Michigan provides a unique platform from which to launch this initiative. We have one of the strongest collections of health sciences education programs, deep engagement in cutting-edge informational and educational technologies, and a vision for global service. Our 2008 Hewlett Foundation-supported planning grant, referenced throughout this proposal, provides us the evidence-based approach we are recommending. The president, provost, deans of health sciences schools, and key faculty are all committed to this exciting venture.

OER Africa
OER Africa is an innovative new project, headquartered in Nairobi, Kenya, under the auspices of the South African Institute for Distance Education (SAIDE) <http://www.saide.org.za>. OER Africa was established to play a leading role in driving the development and use of Open Educational Resources (OER) on the African continent. With seed funding from the Hewlett Foundation, OER Africa will provide a unique opportunity to

deploy African experts and expertise to harness the concept of OER to the benefit of higher education[2] systems, institutions, academics, and students on the continent and around the world. More information on OER Africa can be found at <http://www.oerafrica.org>.

Partner Institutions
Through campus visits in February/March by a delegation led by U-M President Mary Sue Coleman, a May workshop in Accra, Ghana, and follow up campus visits by U-M and OER Africa in July/August, we have established and will continue to build relationships with several African universities interested in Health OER. Our proposal is to start community building around Health OER with a set of early adopters. Joining the University of Michigan, the partner institutions are the University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), the University of Cape Town (UCT), and the University of the Western Cape (UWC). The University of Michigan has had a decades-long health education partnership with institutions in Ghana and has established academic ties with UCT and UWC. Lead individuals for the African institutions are KNUST Health Sciences Provost Peter Donkor, University of Ghana Health Sciences Provost Aaron Lawson, UCT Health Sciences Dean Marian Jacobs, and UWC School of Dentistry Dean M.H. Moola. Each of the deans and provosts has engaged the deans of their respective faculties in our meetings to provide the input to this proposal.

B. Problem/Theory of Action

The 2009 Health OER initiative is a one year exercise designed to develop a sustainable and scalable proof-of-concept for systematic rollout of Open Educational Resources (OER) to support health education, particularly in developing countries. In a nutshell, 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 licensing frameworks is emerging to govern how OERs 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 is not the same as online or e-learning. OER can be delivered in print, on disc, on hard drives, to mobile devices via GPRS and other means, to cached and mirrored servers, and so on.

The University of Michigan is seeking to enhance its international presence and collaborations, while serving the public in the state and nation, by disseminating knowledge of and facilitating connections with other parts of the world. OER Africa is seeking to establish a presence in the health sector, as a key point of intervention to demonstrate the potential and value of OER in helping to establish vibrant, sustainable African higher education institutions. Together, these two organizations will manage this initiative. (Appendix 4 summarizes the management plan.)

Our 'Theory of Change' begins by identifying a clear set of specific problems, as follows:
1. We need to prepare students in health profession schools to practice in a global health context.
2. There are poor health outcomes in Africa's developing countries, as documented in the millennium development goals <http://www.un.org/millenniumgoals/>.
3. There are too few health care providers in Africa.[3] However, African countries, particularly Ghana and South Africa, do have enough qualified students who can be taught to become health care providers.

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[2] The Association of African University's (AAU) Working Group on Higher Education recommends that their definition of higher education should include tertiary education institutions other than universities. In addition, at the second African Union Meetings of Experts, higher education was described as including all post secondary education, including universities, polytechnics and technical colleges, teacher training institutions, institutes for medical training and agriculture (and other fields), distance education centers, and research centers and institutes, with the possibility of expanding to include other forms of post-secondary education. For the purposes of this document, therefore, this approach of the AAU has been adopted and higher education is considered to refer to all post-secondary education.
Reference: Association of African Universities. Working Group on Higher Education. Retrieved January 20, 2007 from AAU website: <http://www.aau.org/wghe/index.htm>.

4. There are too few faculty members in Africa to teach both basic and clinical sciences (i.e., insufficient institutional capacity). Existing faculty are overtaxed in time and ability to teach, reducing time available for ongoing program and materials development.
5. There are too many students enrolled in programs for the amount of money available to run those programs.
6. There are too few learning resources for learners and lecturers in Africa, and many of those available are too expensive to be purchased by universities or students. Existing content is often not based on evidence-based educational design principles.
7. 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.

Our project design is premised on the following key assumptions:
1. Training of more health care providers can lead to improved patient outcomes.
2. Ghanaian and South African academic medical centers have sufficient patient encounters (numbers and presentations) for additional trainees.
3. More productive learners and faculty members can lead to more and better trained health care providers.
4. While 'brain drain' is a concern with education programs in Africa, Michigan has demonstrated in previous education collaborations (in Ghana in particular) that health care workers can be trained and supported in such a way that they are motivated to stay in their native country.
5. Increased availability of relevant, need-targeted learning materials can contribute to more productive learners and faculty members. (Evaluation of this assumption will be a key component of our impact assessment efforts.)
6. The potential of OER is best achieved through a collaborative partnership of people working in communities of practice. Collaborative OER processes built on networks of peer faculty members can lead to increased availability of relevant, need-targeted learning materials by facilitating sustainability, achieving a better understanding of learners' needs, and motivating contributions from participating institutions.
7. Because OER removes restrictions around copying resources, it holds potential for reducing the cost of accessing educational materials.
8. The principle of allowing adaptation of materials contributes to enabling learners to be active participants in educational processes, whereby they learn by doing and creating, not just by passively reading and absorbing.
9. OER has the potential to build capacity in African higher education institutions by providing educators with access, at low or no cost, to the means of production to develop their competence in producing educational materials and completing the necessary instructional design to integrate such materials into high quality programs of learning.
10. To be successful and sustainable, development of OER cannot be a sideline activity within a university. It must be integrated into institutional processes in order to both leverage its potential and provide for its sustainability. Likewise, institutional policies, particularly around intellectual property rights, remuneration, and promotion, need to be adapted to support and sustain development and use of OER. OER's potential includes bringing transparency to educational processes, facilitating collaborations between faculty members and students at different institutions, and establishing a new economic model for procuring and publishing learning materials. Ultimately, a key to its success will be to demonstrate that, in the medium- to long-term it will help over-stretched faculty members to manage their work more effectively, rather than adding new work requirements to their job description.
11. Although our long-term vision for OER will seek to be expansive in terms of its possibilities, the project will seek to design OER that can work immediately, and add educational value, within the current ICT infrastructure constraints of all of the participating institutions.

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[3] World Health Organization. Working Together for Health: The World Health Report 2006. WHO Publications: Geneva. 2006.

Given the above, the approach of this project is to initiate a series of collaborative exchanges with Faculties of Health Sciences at five universities, two in Ghana (KNUST and UG), two in South Africa (UCT and UWC), and U-M in the U.S. These exchanges will lead to identification and implementation of a series of faculty-led engagements, which will result either in the creation of new OER or the identification and adaptation, as appropriate, of existing OER to support specific educational processes within each university. Where appropriate, these initiatives will be run collaboratively between the institutions, while the mobilization of human capacity to implement the initiatives will – to the greatest extent possible – be done from within the partner institutions. In this way, the project will serve to ensure that it does not simply deliver existing OER to passive African Faculties of Medicine, but rather that they are engaged as active producers of content and that the project serves to build institutional capacity through its implementation. The results of all of these efforts will be shared through a Community of Practice space established within the OER Africa website. Where new content is produced through this collaboration and is free from pre-existing prohibitive copyright regulations, it will be pushed out into global repositories, making it available to others beyond the duration of the communities of practice that result from and for this project. The partners will seek to determine, amongst other issues:

- Appropriate applications for different kinds of media in diverse forms of health education, as well as requirements for effective use of these media in multiple educational settings;
- The extent of adaptation required when sharing OER between institutions, both across the developing world and between the developing and developed world;
- The costs of producing and adapting OER for effective health education, with a view to scaling up this work on a large scale across identified health programs;
- Appropriate global sources of OER and relevant OER repositories for use in the health sector (including partnering where possible with other OER biomedical education efforts), with particular emphasis on any already being used within participating institutions; and
- Effective strategies for harnessing OER initiatives to build institutional capacity in African universities.

The project acknowledges, though, that such work – undertaken in isolation – is unlikely to lead to sustainable changes in practice. Consequently, in parallel, we will undertake a series of institutional engagements, working with participating universities to review and adapt institutional policies to facilitate growing cost-effective and sustainable deployment of OER. Throughout these processes, best practices from the participating institutions and from around the world will be shared amongst the partners, and made available for general access, through the OER Africa website.

C. Inputs

See Section 5 for the budget justification details, Appendix 1 for the CVs for key participants, and Appendix 3 for the budget.

A March 2008 planning grant award from the Hewlett Foundation supported Michigan's work to develop a collaborative plan for moving forward with Health OER and our proof-of-concept effort to build an evidence-based approach for converting health education materials to OER. We now have over a year of experience at Michigan with the dScribe process, an innovative system for minimizing the costs of reviewing materials and maximizing faculty and student participation in the generation of OER content[4]. Students trained as dScribes follow a set of detailed content-clearing practices (covering discarding, replacing, re-creating, or retaining materials) captured in a workflow process using web-based software that automates the processes. The dScribe process also allows students to engage creatively with faculty members in enhancing learning materials. Our goal is to make it easy for faculty to find help turning their educational materials into OER and for students to

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[4] https://open.umich.edu/projects/oer.php#dscribe

become engaged advocates in the generation of OER from which they will benefit. We have created materials for training dScribes, leading to a team of medical students working during their summer break to publish materials from the first year of medical school. At Michigan, Nursing, Public Health, Dentistry, and the School of Information all have dScribe-based OER projects underway. Materials are published on an eduCommons site and made available through our portal <https://open.umich.edu>.

The data from the U-M medical student dScribe efforts in June through August 2008 showed that two days of training plus weekly mentoring sessions could lead to productive and fairly independent processing of learning materials. (One student worked remotely from Egypt and New York City.) The medical students averaged 139 hours of analysis and faculty engagement for each published medical school sequence (a sequence approximates a course). Based on enhanced training materials and updates made to the software tool, we expect to lower the number of hours required per sequence. With Michigan's Dr. Engleberg on sabbatical in Ghana from September 2008, we expect the knowledge transfer on the dScribe process to commence very quickly upon project start.

The OER software tool is in production use and the current version will support the 2009 Health OER content projects. While software development is not a component of this proposal, we have demonstrated the tool to a number of universities and in the coming months will develop a community-based proposal for seeking additional funding.

We have a very active legal and policy team at Michigan providing detailed review of the dScribe workflow and support for incorporating fair use as an option in our content clearing. These policy experiences will feed into this proposal's institutional engagement efforts as will OER Africa's early work with universities in Africa.

Michigan held a workshop on 27 May 2008 in Accra, Ghana with the support of the Soros Open Society Institute and participation from a number of African institutions. Input from that workshop and subsequent campus visits by Michigan and OER Africa to UG, KNUST, UCT, and UWC during July and August led to the plan laid out in this proposal.

D. Activities

Institutional Policy Engagement
In our Theory of Change for this collaborative health project, we note that the success and sustainability of OER is predicated upon its meaningful integration into the institutional processes of a university. We further note that, whilst OER provides the potential to positively transform teaching and learning practice, this transformation is unlikely to occur in the absence of supportive institutional policy frameworks. Accordingly, this project will offer participating universities practical support in the mapping and review of their existing policies with regard, for example, to intellectual property rights, materials development, and remuneration. We will facilitate the adaptation of such policies or indeed their elaboration into an over-arching OER policy framework that, in accordance with their particular circumstances, will support and sustain the development and use of OER in the participating universities.

Proposed process:
1. Participating universities will gather and supply institutional policy documentation pertaining to intellectual property ownership of materials development/curriculum design; faculty support/recognition/remuneration; content standards and quality assurance; technology/infrastructure; and financial support/sustainability.
2. We will analyze the above documentation for possible gaps regarding OER implementation.
3. We will plan workshops to cover any gaps in such areas as:
    - Faculty support/recognition
    - Localization/adaptation/translation

- Intellectual property issues
- Technology/infrastructure
- Content standards and quality assurance
- Financial support/sustainability
- Cultural acceptance of learner-centered approaches to health education

4. We will facilitate sensitization workshops to heighten faculty awareness of the above issues relevant to the proposed process of collaborative development and sharing of materials. These workshops will seek to draw out and address possible reasons for resistance from faculty and administration to the proposed process of collaborative development and sharing of materials. The sensitization workshops will also introduce the concept of how increased availability of OER-based learning materials can facilitate any longer-term, more learner-centered approach to health education.
5. We will work with institutions to turn the results of these focused workshops into detailed strategies for policy amendments responsive to their needs.

Health OER Publishing Projects

To learn, in a practical way, about the local and inter-institutional challenges and opportunities in OER publishing and use, we will undertake OER projects at each university. The structure is based on a determination by the participating universities of how best their needs might be served through the development of projects that demonstrate the efficacy of OER in meeting specific teaching or learning challenges. To build institutional capacity in OER development, OER Africa and U-M will jointly host a content development workshop at each university. OER Africa will provide management and general pedagogical skills support and U-M will offer domain specialists in the requisite health field.

1. Each institution will provide a prioritized list of potential materials to publish or acquire (e.g., lecture materials, textbooks, simulations, innovative assessments, and clinical skills development videos) based on an audit of currently available materials and a needs assessment (the "demand pull"). Projects should be of a size where the materials can be cleared, published, and used in a teaching and learning setting within calendar year 2009. Preliminary lists illustrating a potential range of priorities are attached as Appendix 2 to this proposal.
2. Participating institutions will cooperatively review the priority lists to identify a mix of collaborative opportunities and solo-institution efforts, which can include adoption or adaptation of current materials or creation of new materials. The preliminary lists show that while there are differences in priorities, there is also overlap that lends itself well to co-creation of learning materials. Co-creation will provide the most overall value, as it will test the ability to collaborate across different curricula, different policy environments, and different time zones. Co-creation will also ensure that materials are contextually appropriate, accurately representing the patient demographics and presentations students will see. Although facilitating collaboration within and between institutions can be difficult, we have been careful to select institutional partners in which the Deans of Faculties are committed to greater collaboration and sharing within their institutions, as well as institutions that have already expressed strong interest in inter-institutional collaboration. The small initial size of participating institutions will help to ensure that managing and stimulating collaboration is a realistic outcome of the project. It is our intention to use this to model the benefits of intra- and inter-institutional collaboration.
3. We will design a faculty development workshop that will cover OER fundamentals (e.g., intellectual property issues, experiences from other disciplines and institutions), OER clearing and publishing (based on Michigan's dScribe workflow and OER software tool), and effective integration of OER materials into a health professions curriculum. The workshop will engage faculty members in exploring how the resulting OER-based learning materials can be evaluated in the context of enhancing student learning outcomes. Aspects of the workshop can be generalized for application in different disciplines.
4. We will identify and train regional workshop instructors, preferably from the participating institutions, with the goals of building leadership capacity within the institutions and facilitating scaling of workshop delivery both within Africa and globally in the future.

5. Professors, lecturers, librarians, and other academic staff selected for the OER efforts at each institution will participate in the appropriate workshops and be provided ongoing mentoring and support through the year, as needed, on the dScribe clearing and publishing processes.
6. We will recruit students to be trained as dScribes, working with the faculty members on clearing and publishing learning materials. Michigan's experience shows that student dScribes can provide feedback to faculty members and dScribe mentors on the course content and their own needs as learners. We have observed in certain cultures that feedback is best delivered not directly but through objective third parties; we will evaluate the culturally appropriate feedback loops for the context of this partnership.
7. OER content efforts will be evaluated to identify any materials that can be abstracted and used as content frameworks (e.g., templates for virtual patient cases). That which can be done easily within existing resources can be pursued during the 2009 period. Other opportunities will be noted for follow-on efforts.
8. We will design and hold a workshop, likely in Cape Town, with two representatives from each participating university, for the purposes of reviewing project activities and reinforcing the possibilities for collaborations among the institutions.
9. U-M will capture feedback on the dScribe clearing and publishing workflow to improve the workflow, identifying any issues unique to institutions or countries that emerge, and to generate requirements for the next generation of the OER software tool.
10. U-M and OER Africa will establish the www.oerafrica.org Health OER community of practice site as a support hub for the 2009 activities. The coordinated publishing of project news, information, and content will be kept current and distributed both to the initial core participants and the wider Health OER and discipline-independent OER communities. Content will be published through appropriate content repositories as determined by the community's needs (e.g., size of materials, network performance, and features). That is, rather than create new content sites we will use existing campus or international repositories and catalogs (e.g., MedEdPortal and MERLOT).

Impact Analysis
We will undertake a design effort for measuring the impact of OER development and deployment on institutional and individual attitudes and behaviors and on learning outcomes. Preliminary discussions with the OLnet partnership of Carnegie Mellon University and the Open University, which is proposing a research network for OER development and use, have revealed mutual interest in evidence-based approaches to documenting the impact of OER materials on student learning outcomes. If the OLnet and Health OER proposals are successfully awarded, we will propose engaging the Health OER initiative as an early member of the OLnet community.
1. Framework for a longitudinal impact analysis
    a. Establish a metric for teaching efficiency (e.g., student contact hours per faculty member per year) and design a study for collecting current status and tracking changes over subsequent years. If funded through follow-on proposals, the study will commence in 2010.
    b. Create a framework for assessing baseline student competency, e.g., via an Institute for International Medical Education (IIME) exam that would be adapted for local practices. If funded through follow-on proposals, the exam would be created, potentially by the U.S. National Board of Medical Examiners (NBME), and delivered in 2010. Follow-on testing will be used to investigate any effects OER may have on student learning outcomes.

2. Short term analysis and feedback on collaboration capacity:
    a. Investigate the socio-technical aspects of collaborative practices across participant sites to understand the collaborative needs of faculty members, students, and administrators.
    b. Understand social and technical principles that can lead to sustainable and effective collaboration on creation of OER learning resources by participants from developed and developing countries.

      c. Make recommendations on how to overcome challenges caused by geographical distribution of participants, cultural and competitive barriers to collaboration, disparity of social and technical infrastructure of developed and developing countries, and diverse needs of participants both between developed and developing countries and among developing countries themselves.

E. Outcomes

The anticipated project outcomes are followed, in parentheses, by the means of demonstrating achievement of the outcomes.

Institutional Policy Engagement Outcomes
- Reduced policy barriers to OER development and use (documented by changes in policies and practices observed over the medium term)
- Proactive identification, creation, and facilitation of face to face and online Communities of Practice in OER creation and sharing, in identified curriculum priority areas (visible by the activity on the oerafrica.org community of practice web site)
- Management of OER development workshops of 10 – 15 participants to support creation of face to face and online Communities of Practice and their associated work priorities (documented by the number of participants trained)
- Development of a Policy Guide on OER, with a specific focus on application of the concept in African higher education (the Guide being the demonstrated outcome)
- Development of an investment guide that documents the financial and opportunity costs inherent in Health OER engagement and the resulting benefits observed and anticipated. This return on investment analysis will provide higher education administrators and government ministries a basis for justifying further support for developing and implementing OER learning materials.
- Development of an infrastructure analysis report that documents how the initiative addressed any learning infrastructure challenges in building and implementing OER materials, including support staffing, facilities, electrical power, network bandwidth, and computer access. This would include identifying reasons for why the initiative potentially made materials available in different formats (e.g., via the web, on stand-alone computers, on CD/DVD, via mobile phone, and on paper).
- Ongoing development of the OER Africa web presence, with a particular focus on building spaces for interaction between Africa based and global online communities of practice (visible by the activity on the oerafrica.org community of practice web site)

Health OER Publishing Process Outcomes
- Community of trained OER developers and implementers (as measured by active projects)
- Trained workshop facilitators from the participating institutions (visible by successful delivery of the workshops)
- Learning materials published as OER and implemented in the curricula of participating institutions (as published in OER repositories and observed in the curricula)
- Completeness of Health OER workflows as enhanced both in the core and in institution- and nation-specific versions (documented through updated and published versions of the workflow)
- An engagement process accessible to a growing number of institutions that wish to participate in Health OER as content providers and users (seen in our anticipated ability to opportunistically add institutions to Health OER during the short to medium term)
- Awareness of the project's efforts by the global health education community (through presentations given at conferences and statistics from the web site)
- Funding proposals to expand content areas to additional health education domains (the proposals will be developed by the Health OER community)

- Funding proposals to enhance the OER software tool with new functionality (the proposals will be developed by the Health OER and broader OER communities)

Impact Analysis Outcomes
- Understanding of the contribution OER makes to faculty productivity and student learning outcomes (a longer term outcome based on research studies designed in 2009)
- Consensus on a measure of faculty productivity (part of the study undertaken in 2009)
- Consensus on the approach to studying the impact of OER availability on learning outcomes (part of the study undertaken in 2009)
- Understanding of the barriers to and enablers of inter-institutional collaboration around OER development and use (documented in short- and medium-term recommendations published to the Health OER and broad OER communities)

Planning Outcome
- A long-term logic model for Health OER based on a vision that multiple stakeholders will feel they own, in which funders will invest, and which institutions are committed to sustaining (as documented in a follow-on proposal for a multi-year Global Health OER initiative)

An obstacle to achieving our goals is institutional resistance to change, thus the emphasis we have placed on engagement from the highest level combined with faculty member support. The other major obstacle is getting the release time for the faculty members to participate, which is why the institutional grants are necessary investments.

We expect much of the institutional engagement outcomes can be generalized, which is why we benefit from OER Africa's activities with other universities and in other disciplines and why OER Africa believes it can enhance its continent-wide efforts by lessons from this initiative. The areas of potential differentiation, such as patient privacy and societal norms around displaying medical images, could be examined for applicability to other domain, such as the visual arts. The workflow and software tools used in the OER clearing and publishing process are discipline-independent. All of the impact analysis can be broadly applied except for the specific instrument that we will design for measuring student learning outcomes, which would be healthcare specific.

F. Evaluation

We will evaluate our strategy and outcomes through a variety of means. 2009 will be a year of primarily formative evaluation, in which the structure and issues of Health OER are defined. Formative evaluation strategies, such as surveys, questionnaires, interviews, and focus groups, will be used to gather information. Information from the impact analysis activities listed above will be complemented by the following efforts:
- Participant feedback will be gathered after each workshop and during the content projects. For example, faculty members will provide insight as to the support they require to adapt, adopt and co-create materials and whether they have adequate release time to work on the project. We will explore what motivates faculty members and students to participate in OER efforts and how they will balance OER engagements with other responsibilities. We will elicit feedback on the elements of the workshops and content efforts that should be replicated and those elements needing improvement before scaling beyond the five initial institutions. Students will provide information as to the usefulness of and ease-of-access to the OER materials.
- Institutional engagement will be measured, in part, by asking faculty members and senior leadership what they gained, if anything, from participation in this process. That is, what contributions do they feel this project made to their institution's development, strategic objectives, sustainability, and organizational processes with regard to materials development, collegial support, professional development and recognition, and remuneration? From this assessment, we will document a value proposition for participating in OER-based shared learning initiatives for institutions in both

developed and developing countries. The list of institutional benefits will be used in future phases of Health OER to engage new partners.

- We will continue to publish the dScribe clearing and publishing workflow online, as updated by the five participating institutions, for public comment and will review the workflow at relevant conferences (e.g., OCW Consortium).
- We will use online project planning and tracking tools.
- OER Africa will assume the primary responsibility for finding a consultant from Africa who is knowledgeable in program evaluation and understands the needs and perspectives of all involved institutions. This person will undertake a project assessment based on criteria developed by the partner institutions.

Approximately 15% of our overall budget will go to evaluation, including the program evaluation consultant, the analysis of faculty productivity and student outcomes, and the socio-technical study into institutional capacity for collaborative engagement.
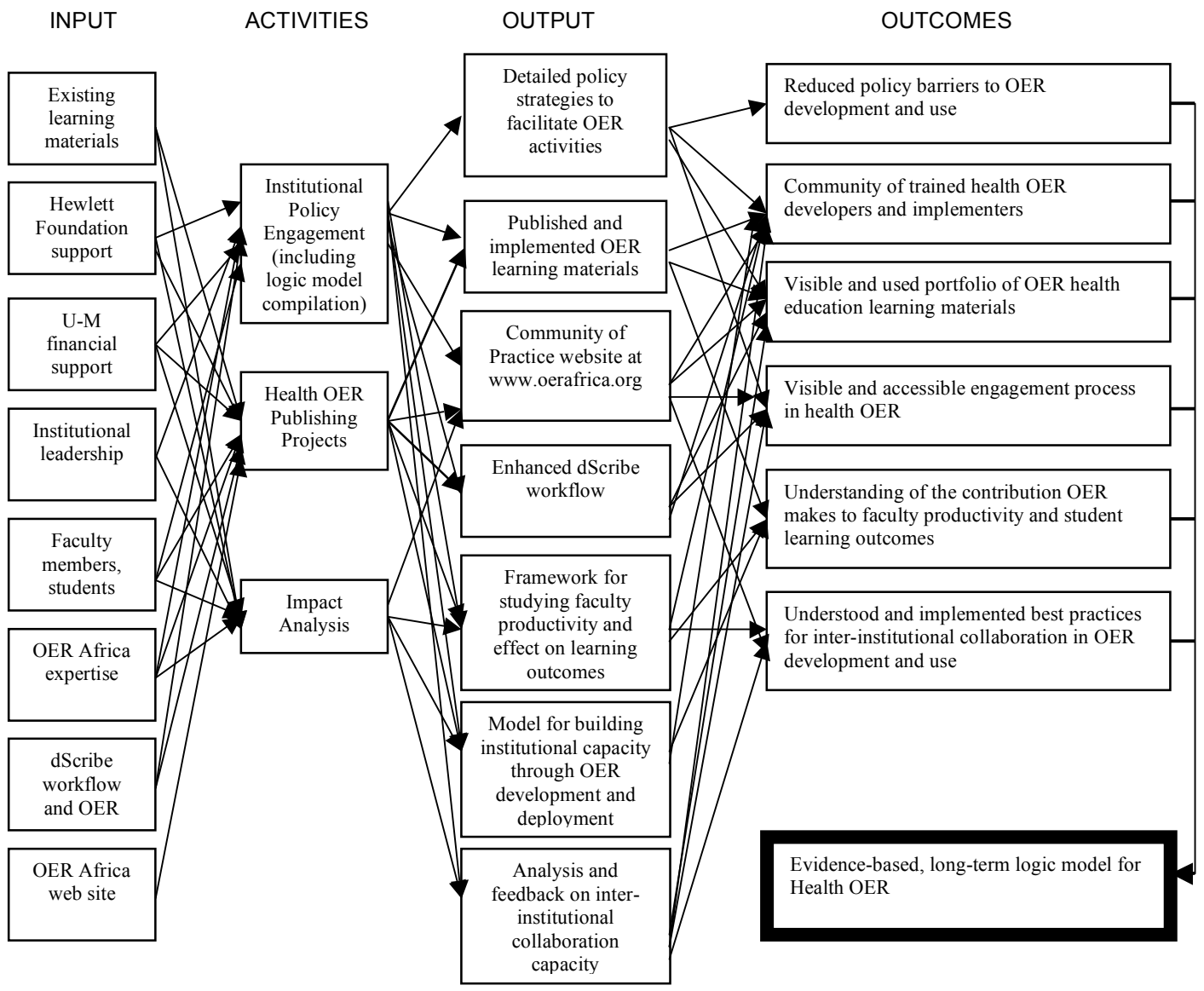
G. Intellectual Property Rights

1. The respective authors (institutions and individual faculty members as determined by local policy) will hold the copyright for materials created in this collaboration.
2. Learning materials published through this effort will use the Creative Commons 3.0 License (preferably BY-Attribution) or appropriate Creative Commons version as applicable by local copyright law. Any differences in national copyright law will be explored during the institutional engagement efforts so that we can support publishing materials with multiple authors and multiple licenses.
3. Supporting materials (reports, publications, workflow documents, etc.) will also be published using Creative Commons licenses.

H. Compelling Reasons for the Grant

1. To model strategies for ensuring that African faculty become effective producers of OER and that OER is harnessed to develop capacity systematically at African universities.
2. To promote low-cost, sustainable solutions for producing OER.
3. To facilitate inter-university, demand-driven collaborations in publishing health education materials as OER.

OER
OPEN EDUCATIONAL RESOURCES

SECTION 3. LOGIC MODEL

INPUT	ACTIVITIES	OUTPUT	OUTCOMES

INPUT
- Existing learning materials
- Hewlett Foundation support
- U-M financial support
- Institutional leadership
- Faculty members, students
- OER Africa expertise
- dScribe workflow and OER
- OER Africa web site

ACTIVITIES
- Institutional Policy Engagement (including logic model compilation)
- Health OER Publishing Projects
- Impact Analysis

OUTPUT
- Detailed policy strategies to facilitate OER activities
- Published and implemented OER learning materials
- Community of Practice website at www.oerafrica.org
- Enhanced dScribe workflow
- Framework for studying faculty productivity and effect on learning outcomes
- Model for building institutional capacity through OER development and deployment
- Analysis and feedback on inter-institutional collaboration capacity

OUTCOMES
- Reduced policy barriers to OER development and use
- Community of trained health OER developers and implementers
- Visible and used portfolio of OER health education learning materials
- Visible and accessible engagement process in health OER
- Understanding of the contribution OER makes to faculty productivity and student learning outcomes
- Understood and implemented best practices for inter-institutional collaboration in OER development and use
- Evidence-based, long-term logic model for Health OER

SECTION 4. PROGRAM CHART

CATEGORY	INDICATORS	BASELINES	TARGETS AND TARGET DATES
Activities/Outputs			
♦ Collaborative content creation projects	♦ Prioritized list of project areas ♦ A workflow tool that allows faculty and dScribes to work asynchronously ♦ Amount of published content ♦ Amount of materials used within learning activities ♦ Feedback from students on the use of OER ♦ Use of OER software tool	♦ Preliminary list attached to this proposal ♦ Workflow tool developed over 2007 and 2008 by Michigan ♦ Proof-of-concept materials developed in 2008 by Michigan ♦ 2008 version of the OER tool	♦ Content projects identified by March 31, 2009 ♦ Workflow tool revision based on multi-institutional input by September 30, 2009 ♦ OER learning materials from collaborative efforts deployed in at least three universities' curricula by end of 2009 ♦ Prioritized functional requirements list by September 30, 2009 for an OER software tool future release
♦ Faculty development workshops	♦ At least two newly trained workshop leaders ♦ At least 25 faculty members trained in collaborative OER adoption and co-creation	♦ dScribe training materials developed at Michigan	♦ Campus-based workshops delivered by June 30, 2009 ♦ Multi-institutional workshop run by October 31, 2009
♦ Institutional engagement workshops and meetings	♦ Compilation of existing policies relevant to OER with analysis of any policy gaps ♦ Consensus statements around intellectual property standards and processes	♦ None	♦ Terms of reference documented for 2009 deliverables supported by institutional grants by March 31, 2009 ♦ Engagement workshops, data collection, and analysis complete by March 31, 2009 ♦ Intellectual property consensus statements by August 31, 2009
♦ Impact analysis	♦ Framework for future studies	♦ None	♦ Faculty productivity metric established by June 30, 2009 ♦ Student learning outcomes assessment framework defined by September 30, 2009
♦ Project evaluation	♦ OER Africa selects evaluator from Africa ♦ Evaluator meets with grant participants to understand the long-term goals ♦ Metrics (qualitative and quantitative) are agreed upon that will measure the goals	♦ None	♦ Summative evaluation design completed by December 31, 2009 ♦ Formative evaluation report completed by January 31, 2010

♦ Community of practice web site	♦ Publication of news, project information, and content through the coordinated platforms of OER Africa's community of practice site and appropriate content repositories	♦ Community of practice site set up for notes of May 2008 Health OER workshop	♦ Ongoing
♦ Long term logic model	♦ Consensus around sustainability models	♦ None	♦ By December 2009

Intermediate Outcomes

♦ Community of practice web site	♦ Best practices materials covering institutional policies, outcomes-based learning using OER, etc. ♦ Case studies from multiple health science domains ♦ Research publications on the effective use of OER-based learning materials ♦ Federated search capability across growing collections of Health OER learning materials	♦ Community of practice site set up for notes of May 2008 Health OER workshop	♦ 3-4 years
♦ Enhanced student learning	♦ Research results on improved learning outcomes correlated to OER access	♦ None	♦ 3-4 years
♦ Global Health OER program with a supported engagement process that supports scalable, sustainable engagement in Health OER content development and implementation	♦ Numbers of universities and numbers of nations engaged	♦ Does not currently exist	♦ At least 20 institutions from four continents participating in 2-3 years

Ultimate Outcomes

♦ Increased numbers of health care provider graduates	♦ Graduation levels for physicians, dentists, nurses, public health workers, etc.	♦ Currently there is more student demand than the system can support	♦ 10 years
♦ Improved outcomes for patient populations	♦ Health care statistics	♦ Sub-optimal patient/provider ratios	♦ 10-15 years

SECTION 5. FINANCIAL INFORMATION

5.1 Detailed Budget Description

See Appendix 3 for Financial Spreadsheet

Personnel

James O. Woolliscroft, MD, is Dean of the University of Michigan Medical School, Lyle C. Roll Professor of Medicine, and Professor of Internal Medicine and Medical Education. Dr. Woolliscroft is an internationally recognized medical educator who has introduced innovations in clinical skills training, developed international academic programs, and participated in national education standards activities. He will serve as principal investigator on this proposal. Dr. Woolliscroft initiated U-M's Health OER efforts and will engage with his peers at collaborating institutions on strategic issues. His effort will be concurrent with his current position.

Cary Engleberg, MD, will spend 10% of his effort on this project. For nine months of 2009, Dr. Engleberg will be based in Ghana and will work on the identified content projects primarily with colleagues at UG and KNUST. Dr. Engleberg will make at least one trip to Cape Town to facilitate the inter-institutional collaborative efforts.

Ted Hanss, MBA will serve as co-investigator and operations director on this proposal and as the liaison to OER Africa, spending 20% of his effort on this project. The Office of Enabling Technologies will pay his entire effort towards this project. As the Director of the Office of Enabling Technologies, reporting to Dean Woolliscroft, he directs the dScribe efforts (both regular staff serving as dScribe 2s and student dScribes), OER software tool development team, and assessment and evaluation activities. He will provide oversight for all aspects of the project and coordinate communication between teams, faculty, international colleagues, and the foundation. He will ensure that the project meets timelines and objectives stated in this proposal.

Pieter Kleymeer and *Garin Fons* are leaders of the dScribe processes, working for the Office of Enabling Technologies. Pieter and Garin have advanced degrees in information sciences, with special training in both information technology and intellectual property management. They will train dScribes, train people to become new dScribe trainers, monitor and supervise dScribe activity at Michigan, mentor dScribes at other institutions, develop and maintain the dScribe process, provide tracking and triage of educational objects under review, and provide statistical and financial data on ongoing processes. These individuals are the key operational individuals in the dScribe process. Both Kleymeer and Fons will spend 25% of their time on this project, with 10% of their time requested in this proposal and the remaining 15% funded as a cost-share component from the Office of Enabling Technologies.

Karen Kost is a senior administrative assistant in the Office of Enabling Technologies. She is expected to spend 5% of her University effort on this project. Ms. Kost will provide administrative support for the project including internal and external communication, production of documents and reports, facilitating communications, maintaining financial records, providing disbursements, and generating financial reports for this project. Her effort will be cost-shared by the Office of Enabling Technologies.

Airong Luo, PhD, is a social scientist in the Office of Enabling Technologies and will lead the socio-technical investigation into collaborative practices across participant sites. Dr. Luo will design and implement the study protocol drawing from such tools as survey instruments, interviews, and observation. She will provide feedback for improving collaborations during 2009 and make recommendations on the scaled up Health OER efforts in 2010 and beyond. Dr. Luo will spend 25% of her time on this assessment effort.

Emily Springfield is an instructional designer for the U-M School of Dentistry with a focus on learning technology. She will work with the Dentistry faculty to put courses and resources online for the OER project.

She will also assist in evaluation of the project. As part of this grant, Ms. Springfield will spend 20% of her time developing and adapting Dental School courses as Open Educational Resources, coordinating between dScribes and faculty in the U-M School of Dentistry and faculty and dScribes at the partner institutions.

OER Africa will take responsibility for the following administrative tasks: establish and manage work contracts with the four African institutions and, as required, provide technical support to institutions in the elaboration of their work programs and the completion of their respective institutional OER projects; facilitate sensitization and policy workshops; provide ongoing electronic support to content development projects, including support on the use of the OER Africa website in general and the Health OER Community of Practice space in particular; and identify a project evaluator from a pool of African expertise. $60,200 has been allocated to cover these administrative responsibilities. The OER Africa Project Director, Catherine Ngugi, will direct the project implementation efforts on behalf of OER Africa and serve as the liaison to U-M. Her effort will be concurrent with her current position and her time will be funded through an existing Hewlett Foundation grant. Accordingly, these resources are requested for the OER Strategist (Neil Butcher), the OER Africa Project Coordinator, and the OER Africa website administrator

Publication Manager. This person is responsible for the overall public face of Health OER, setting the strategy and approach for communications in all media. He or she will coordinate with OER Africa on the www.oerafrica.org community of practice site, setting the standards for publishing text, graphics, and video materials from U-M and partners and providing an interactive work environment for the collaborative development and publishing of open educational resources. This person will spend 25% of his or her time in this role.

Benefits for the University of Michigan are estimated at the customary University rate of 30% to cover all health, disability, and retirement benefits for individuals.

Consulting

Joseph Fantone, MD, is the Associate Dean for Education at the University of Michigan Medical School. Dr. Fantone is the faculty lead for the Medical School's OER activities and, as part of his current capacity, will advise on the publication and use of OER materials within the Medical School's curriculum.

Joseph Hardin is Clinical Assistant Professor in the School of Information. Joseph is the Director of the Collaborative Technologies Lab at the Duderstadt Center, has been leading the University of Michigan Sakai open source software effort, and has been working with faculty, staff and students to develop both an understanding of open educational resources dynamics and practices and software to integrate open courseware generation into the practices of faculty and students using Sakai at Michigan. As part of his existing capacity, Professor Hardin will advise on the research and development of dScribe workflow efforts for this project.

Lynn Johnson, PhD is professor and Director of Dental Informatics at the U-M School of Dentistry, and will serve as liaison between dental faculty within the University of Michigan and between Michigan faculty and those of the African partners as part of her existing capacity. Dr. Johnson is currently the president-elect of the Educational Research Group within the International Association for Dental Research. She represented the School of Dentistry at the recent conference at which the International Federation of Dental Educators and Associations was formed at the 2007 Global Congress on Dental Education III in Dublin, Ireland.

David Stern, MD PhD, will lead the design effort for establishing measurement criteria and methods for a longitudinal study of the impact of OER development and deployment on faculty productivity and student learning outcomes. Dr. Stern will be engaged as a private consultant for $15,000 plus the cost of one trip to Africa. The recommended studies are planned for implementation starting in 2010, depending on future funding.

TBD Educational Design Workshop Instructor. We request $27,360 for the hiring, training (as necessary), and deployment of workshop instructor expertise in educational design of open educational resources for health. These individuals are anticipated to come, to the greatest extent possible, from the participating African universities, which will facilitate capacity building as we grow this effort and train additional academic staff.

TBD Project Assessment Leader. We request $15,000 for OER Africa to hire a consultant who is knowledgeable in program evaluation and understands the needs and perspectives of all involved institutions. This person will undertake a project assessment based on criteria developed by the partner institutions. As with the workshop instructor role above, we will look first for this expertise within the participating African institutions.

Institutional Grants

The University of Ghana, Kwame Nkrumah University of Science and Technology, the University of Cape Town, and the University of the Western Cape will each receive a grant of $40,000 to provide the resources necessary for their institutions to participate in the 2009 activities. These funds are to provide for capacity building within the institutions, such as getting release time by senior academic staff from teaching or clinical duties or hiring a junior lecturer to be trained in OER material adoption, adaptation, and creation. Supplies, such as a camera for capturing skills videos, could also be acquired. Upon selection of the 2009 content projects, a detailed memorandum of understanding with each institution will document the project deliverables and grant payment schedule.

Travel and Workshops

We are planning two workshops at each of KNUST and UG. The first workshop is expected to be a two day event on institutional engagement in OER involving senior leadership (five to ten people per institution), which will also include a follow up meeting to present findings and provide support for policy adaptation. Michigan and OER Africa will jointly participate in the institutional engagement workshops, with OER Africa leading on the broad institutional issues and Michigan focusing on the topics specific to health content. OER Africa will staff the follow up meetings. The second workshop is a three day faculty development workshop, with approximately ten attendees expected per institution. The faculty development workshops will address evidence-based effective teaching and learning approaches, with OER processes being the means for acquiring, creating, and publishing enhanced curricular content. OER Africa will supply management and general pedagogical skills support for the faculty workshops and Michigan will provide domain specialists.

Due to the Cape Town institutions' longer engagement with OER policy issues, we plan to hold more limited consultative meetings, rather than workshops, over a total of two days to learn about UCT and UWC policies and procedures and draw out relevant lessons. We will provide faculty workshops in Cape Town similar to those at the Ghanaian institutions. While UCT and UWC have made significant investments in university OER policy development, the engagement of individual academic staff in the skills development for OER is still required.

We will hold one joint content development workshop with two participants from each university, most likely in Cape Town. This workshop will facilitate the collaborative efforts in OER adoption, adaptation, and co-creation.

Travel resources requested will cover roundtrip airfare, hotel costs, ground transportation, meals, and meeting hosting expenses for the workshop and meeting leaders and, in the case of the joint content development workshop, for participant travel as well.

5.2 List of current foundation funders for this project

In 2008, the Hewlett Foundation provided $224,951 for the Health OER planning grant. The Soros Open Society Institute provided $25,000 for a workshop on Health OER that was held on 27 May 2008 in Accra, Ghana.

5.3 IRS Determination Letter

See Appendix 5

Appendix 1: Curriculum Vitae of Key Personnel

James Woolliscroft, MD, is the Dean of the University of Michigan Medical School, Lyle C. Roll Professor of Medicine, and Professor of Internal Medicine and Medical Education. Dr. Woolliscroft received his B.S. summa cum laude in 1972 and his M.D. in 1976 from the University of Minnesota. He completed his Internal Medicine residency at the University of Michigan in 1980. In 1980, he joined the faculty of the Department of Internal Medicine and rose through the academic ranks being promoted to Professor of Internal Medicine in 1993. He has a joint appointment as Professor in the Department of Medical Education.

Dr. Woolliscroft is an internationally recognized medical educator. He has played major roles in medical student, resident and fellow education at the University of Michigan. His leadership has led to multiple educational innovations including the nation's first medical student clinical skills course using community facilities for the elderly as educational sites, introduction of a required multi-station comprehensive clinical assessment for senior students, development of the school's international academic program Global REACH, implementation of a structured clinical examination to assess incoming residents' skills leading to individualized learning agendas, and development of the institution's Clinical Simulation Center. He has also helped to establish standards for education and accreditation at a national level for medical schools as a member of the AAMC's Medical School Objectives Project External Advisory Group and graduate medical education as a member of the ACGME's Outcomes Assessment Project Advisory Group. Dr. Woolliscroft has served as chair of the Association of American Medical Colleges Group on Educational Affairs; the AAMC Research in Medical Education Committee; and as a founding member and President of the Clerkship Directors of Internal Medicine. He has also served on several National Board of Medical Examiners committees.

His research interests in medical education have resulted in numerous publications, invited presentations and visiting professorships across the U.S. and internationally. Dr. Woolliscroft was selected as the first Josiah Macy, Jr. Professor of Medical Education, an endowed professorship awarded through a national competition in 1996. In January 2001, he received a second endowed professorship, the Lyle C. Roll Professor of Medicine recognizing his work in enhancing the practice of medicine through education. He was chosen as a Fellow of the AAMC's Council of Deans in 2003-2004. In 2004 he received the SGIM Career Achievement in Medical Education Award. In 2008 he received the AAMC's Group on Educational Affairs Merrel Flair Award.

At the University of Michigan he has served in several administrative capacities including Associate Chair in the Department of Internal Medicine, Chief of Staff of the University of Michigan Hospitals, Associate Dean and Director of Graduate Medical Education and the Executive Associate Dean of the University of Michigan Medical School. He currently serves as Dean of the University of Michigan Medical School.

Neil Butcher is based in South Africa, from where he has provided policy and technical advice and support to a range of national and international clients regarding uses of educational technology and distance education, both as a full-time employee at the South African Institute for Distance Education (SAIDE) from 1993 to 2001 and as Director of Neil Butcher & Associates. He has worked with various educational institutions, assisting with institutional transformation efforts that focus on harnessing the potential of distance education methods and educational technology as effectively as possible. Neil has traveled extensively through Africa conducting research on distance education and educational technology for a range of organizations. He is currently working as an OER Strategist with SAIDE on its new OER Africa Initiative, which is funded by the Hewlett Foundation.

Neil has developed a range of instructional materials for various types of educators, including education policymakers, development agency staff, teachers, and universities. In the field of IT applications, he is leading the development of South Africa's national education portal for the Department of Education – www.thutong.org.za. He has managed a range of online database and web development projects for various organizations, including a student portal for the Federation of Tertiary Institutions of the Northern Metropolis

(FOTIM), Higher Education South Africa, International Association for Digital Publications, UNESCO, and the Southern African Regional Universities' Association.

Cary Engleberg, MD, DTM&H, is a Professor of Internal Medicine in the Division of Infectious Diseases and Professor of Microbiology & Immunology at the University of Michigan Medical School. In addition to his experience in medical education, he has extensive past experience in cross-cultural and international work. He began his medical career after his Internal Medicine Residency at the George Washington University as a Peace Corps Physician in Chad and Cameroon from 1977 to 1980. He subsequently earned DTM&H at the London School of Hygiene and Tropical Medicine and then served as an EIS Officer for the CDC in the Phoenix Area Indian Health Service. The CDC service also included epidemiologic projects in Bangladesh and Indonesia. Dr. Engleberg was trained in the subspecialty of Infectious Diseases at the University of Texas-San Antonio and secured his first faculty appointment at that institution in 1984. In 1986, he joined the faculty of the Departments of Internal Medicine and Microbiology & Immunology at the University of Michigan, where he was also Chief of the Division of Infectious Diseases from 1994 until 2005. As an NIH-sponsored researcher, Dr. Engleberg has conducted basic research on the pathogenesis of Legionnaires' disease and Group A streptococcus during most of these years. He is the author or co-author of 67 peer-reviewed research articles, 40 book chapters, and Editor-in-Chief of Schaechter's Mechanisms of Microbial Disease, a microbiology textbook for medical students.

During the past decade, his academic interests have gradually tended toward medical education, specifically toward case-based, interactive e-learning. He was a member of the first class of Medical Education Scholars at the University of Michigan in 1998-9. At that time, he had generated an interactive learning program on Vaccines using Authorware. This program has been regularly updated over the years and continues to be a required element of the M1 Microbiology and Infectious Diseases sequence at the medical school. In later years, he added Authorware-based instructional programs for teaching aspects of Parasitology and the evaluation of diagnostic tests. He is a recipient of the Kaiser-Permanente Award for Pre-Clinical Teaching based on his efforts as a lecturer and small group leader in this course. More recently, he was director and key developer of a month-long course in Advanced Medical Therapeutics for the University of Michigan senior class. As of December 2007, this course became a required element of the medical curriculum for all graduates. A "Medicine at Michigan" news article describing the development of this on-line course is available at http://www.medicineatmichigan.org/magazine/2007/fall/edutech/default.asp, and a limited demonstration of the course content can be accessed without a password via the "Technology" link at www.med.umich.edu/lrc/medcurriculum.

In September 2008, Dr. Engleberg begins a one-year sabbatical leave in Ghana with the intent to assist faculty members of the two major medical schools in that country to develop e-learning materials for medical students.

Garin Fons is an Open Education Specialist at the University of Michigan Medical School's Office of Enabling Technologies. He currently coordinates the Open.Michigan dScribe project within the participating Health Science Schools and at the School of Information; manages a variety of policy, intellectual property, and internal communication related initiatives; liaises with legal counsel, technology specialists, and software developers to develop both advisory and technical resources; and oversees the publishing the University's OER materials on the Michigan eduCommons website. Garin received his BA in History and Latin American Studies from Lewis and Clark College in 2005 and his Master of Science in Information from the University of Michigan School of Information in December 2007. While a master's student, he helped lay the groundwork for the Community Informatics specialization and, subsequently, crafted a tailored degree in Community Informatics and Information Policy. Having worked as a Community Manager with the International Development Research Center's (IDRC) telecentre.org initiative, Garin is particularly interested in the use of information and communication technologies for educational, economic and cultural development. He is also attentive to issues regarding information access, efficacy, and use in communities, continuing to play an active in the School of Information Community Information Corps and as a consultant with telecentre.org.

Ted Hanss is Director of Enabling Technologies for the University of Michigan Medical School. Reporting to the dean, Ted directs the strategic application of leading-edge information and communications technologies to support the school's missions, enabling new modes of curriculum delivery and enhancing research capabilities. Current focus areas include learning and research collaboratories (from browser-based collaboration tools to uncompressed HDTV-based videoconferencing), next generation learning management systems, open educational resource initiatives, virtual worlds (e.g., the design and implementation of Wolverine Island, the University's presence in Second Life), cyberinfrastructure, optical networking, data center design, and health informatics.

The Office of Enabling Technologies is the production base for the University of Michigan's OER efforts. Within the Office are the dScribe efforts (both regular staff serving as senior dScribes and student dScribes), the OER software tool development team, assessment and evaluation activities, and the management of the open.umich.edu web site through which Michigan's OER materials are published. Joseph Hardin and Ted together provide the campus leadership for OER.

Ted has a BS in Biology from Boston College, an MBA from the University of Michigan, and is enrolled in the doctoral program in the U-M School of Information. Ted has been with U-M since 1985, working on each new technology wave as it was introduced to the campus. He started with the campus personal computer roll-out and then progressed to Internet technologies, client/server computing, UNIX systems support, distributed computing, campus-wide identity and authentication systems, and campus portals. He has led a computer science research center, software development teams, IT operations, user services, human resources, and training and development programs. He has directly managed budgets of several million dollars per year and staff units of over 50 people. He has been the PI on over $6.5 million in external funding.

Ted was an early advocate of "open." In 1994, while Director of the Center for Information Technology Integration, he created the University of Michigan Open Systems Center as an R&D and training facility for educating higher education and corporate customers in standards-based distributed computing. He also conceived, created, and taught a course in data, voice, and video networking during the 1990s in the U-M Business School where he posted all course materials for public access and re-use, with people outside of Michigan following the course and engaging in discussion via email.

On assignment from Michigan from 1997 to 2004, Ted was employee number one of Internet2, a non-profit consortium of over 300 education, government, and industry members working on Internet futures. Ted was the Director of Applications Development and supervised applications area staff, planned and organized the applications activities, conducted technology assessment, and served as a central point of contact with Internet2 members and government and industry partners on applications issues. He conceived and implemented "Internet2 Days" as a means to raise faculty awareness, resulting in over 65 universities hosting these events. He also initiated Internet2-based arts performance events as a platform for several innovations, including the first live HDTV streams on the Internet, an Internet-based distributed recording studio, and remote master music classes.

With expertise in leading edge, Internet-based distributed computing, he has had significant involvement in national and international standards efforts and consortium activities. He is a frequent speaker on leading edge technology topics, having given scores of invited talks around the world. He has written four book chapters and several articles. He has been interviewed by CNN, National Public Radio, *The New York Times*, *Business Week*, and numerous trade publications.

Joseph Hardin is the Director of the Collaborative Technologies Laboratory in the Duderstadt Center and a Clinical Assistant Professor in the School of Information at the University of Michigan. Joseph is also currently on the Board of the Sakai Foundation, which provides a legal structure for the work of the Sakai Community as it constructs itself and constructs and uses the Sakai Collaboration and Learning Environment

open source software - a modular collection of open source tools to support online education, research and collaboration. Over 150 colleges, universities, and commercial affiliates around the world have joined this effort (see http://sakaiproject.org). Joseph was the founding Chairman of the Board of the Sakai Foundation, and the Principal Investigator on both the Hewlett and Mellon Foundation grants that supported the formation and initial development of the Sakai software and community.

Joseph also has a deep interest in open content systems, material generation processes and use, giving numerous talks at OER and OCW conferences, organizing seminar series and working with projects at Michigan and other schools around the world, including universities in China, Europe and South Africa. He has led the development of the Digital Scribe, or dScribe, efforts at the University of Michigan and within the Sakai Community which seek to combine the power of institutionally adopted VLE/CLEs such as Sakai with distributed workflows and participatory pedagogies to generate OER materials as a low-cost derivative of ongoing educational activities, in the process transforming the educational environment of those institutions.

Joseph has worked on the development of such open and online collaboration systems for a good while, both at the University of Michigan, where he led the development of the CompreHensive collaborativE Framework (CHEF) system, a forerunner of the Sakai system, and when he was Associate Director of Software Development at the National Center for Supercomputing Applications (NCSA) at the University of Illinois-UC, from the early to the late 90´s. There he led the Software Development Group (SDG) at NCSA that built a number of innovative visualization and internet tools, including the Mosaic browsers. He is also a founder of the International World Wide Web Conference Committee <http://www2006.org>, and has taught graduate courses on the Semantic Web, and a course on Open Source Software Systems and their Communities see <http://www-personal.si.umich.edu/~hardin/>.

Lynn Johnson holds a doctorate in Instructional Design and Technology from the University of Iowa with a cognate in computer science, and over twenty years experience in developing and researching innovative educational technologies that support dental education. She currently holds the rank of professor in dentistry and is concurrently the director of the Office of Dental Informatics at the University of Michigan School of Dentistry. She has focused her research in four areas: (1) interactive patient simulations, (2) the assessment of clinical problem-solving skills, (3) innovative uses of multimedia applications for the instruction and evaluation of oral health care providers, and (4) the evaluation of the merit and worth of instructional products and methodologies. She has been the principal investigator on two grants funded by the National Institutes of Health (NIH) and an investigator on seven grants funded by NIH or the National Science Foundation. She is the primary or secondary author on over 40 peer-reviewed manuscripts and 14 peer-reviewed electronic scholarship products. She has served as a consultant to private industry including serving as the project manager for the Dental Interactive Simulation Corporation, a non-profit company developing computer-based simulations for the assessment of dental students and practitioners.

Dr. Johnson directs the dental informatics and information technology activities for the University of Michigan School of Dentistry including learning technologies, the patient information system, and the information and communications infrastructure. Her current research projects include an NIH funded grant to develop Web-based simulations of dental patients with genetic conditions. Using an evidence-based approach, students work collaboratively to resolve patient issues and provide oral health care. She is also currently active in two campus collaboration projects that may be of interest to this open education project—a digital asset management system (DAMS) project and podcasting. The DAMS project, known as BlueStream <http://sitemaker.umich.edu/bluestream/home> at the University of Michigan, is a campus-wide project to develop a cyberinfrastructure that will support the use of multimedia in teaching and learning. One functionality of BlueStream is the use of video analysis tools to search across the content of videos and other media. BlueStream ensures that only users with the appropriate clearances have access to the resulting media. Her work with podcasting demonstrates the power of using proven software development techniques. Podcasting at the University of Michigan was a student-initiated research project that used formative evaluation techniques to prove that audio is a useful tool for lecture review. The result of this research was an

invitation from Apple, Inc. to be one of a handful of schools to help guide the development of iTunes U <http://www.apple.com/education/profiles/michigan_dentistry/>.

Lastly, Dr. Johnson was a member of the September 2007 DentEd World Congress that culminated with the founding of the International Federation of Dental Educators and Associations (IFDEA). A core value for IFDEA is to bring together a community of dental educators to improve oral health world wide by sharing knowledge.

Pieter Kleymeer began working with the University of Michigan Medical School in January 2008 as an Open Education Specialist in the Office of Enabling Technologies. He currently focuses on the design and implementation of a student-centered model (dScribe) to publish open educational resources. His work also involves managing the design and development of software tools to facilitate faculty-student interaction and course content management, specifically to support the dScribe model.

Pieter came to the U-M Medical School upon receiving his Master of Science in Information from the University of Michigan's School of Information at the end of 2007. He received his BSE in Electrical Engineering from the University of Michigan in 2003. Pieter's graduate work centered on understanding the balance between economics, policy, incentive design, and communications technologies in the emerging world of widespread information access, manipulation, and use. Prior to his graduate studies, Pieter served the Federal Communications Commission in Washington, D.C., developing telecommunications and network security policy as well as leading outreach programs for network security best practices.

Airong Luo is currently a post-doctoral research associate at the Office of Enabling Technologies at the University of Michigan Medical School. Her work explores distributed collaboration and the technologies and social practices that make distributed collaboration successful. Her recent work at the Medical School has focused on assessing the faculty's needs for collaborative tools to facilitate research and education, especially in the Department of Family Medicine and the Medical Innovation Center. Her other current projects include examining a national collaboration of Type 1 diabetes researchers, the Brehm Coalition. She studies their existing work and their potential for future collaborative work, evaluating and recommending collaboration tools that fit existing and anticipated practices. She is also working on examining the collaboration needs of researchers funded by NIH Clinical and Translational Science Awards. In the past, she has worked for the Science of Collaboratories project, a five-year study funded by the National Science Foundation, to understand the technical and behavioral principles that lead to successful collaboratory design. Her April 2008 doctoral dissertation examined the impact and effectiveness of collaboratories for scientists in developing countries.

Dr. Luo holds a PhD in Information Science from the University of Michigan-Ann Arbor, an M.A. in Communication from Seoul National University (Korea), and an M.A. in English Language and Literature from Peking University (China).

Catherine Ngugi is the Project Director of *OER Africa*. Prior to holding this post, she established the African Virtual University's Research & Innovation Facility (RIF) in January 2005 and managed it until September 2007. During this period, the RIF hosted two OER projects and launched a Pan-African pilot study on the use of OER in African universities. Catherine holds an MA from the University of London's School of Oriental and African Studies (SOAS).

Catherine began her career in the private sector, working for a multinational manufacturer. In 1997, she relocated to Dakar, Senegal to work with CODESRIA (the Council for the Development of Social Science Research in Africa), where she initiated and coordinated a grants management system and designed the CODESRIA Endowment Plan. Upon joining Oxfam GB, she conducted regional training sessions (Senegal, Mali, and Mauritania) in project sustainability across the organization's regional group and facilitated the funding by SIDA (Swedish International Donor Agency) of the Oxfam GB West Africa Regional Girls Education Program.

Catherine is a Rockefeller Associate of the African Gender Institute, University of Cape Town and has worked as a consultant in higher education and the Arts to various international organizations headquartered in Nairobi. Her work has been published in the *Journal of African Cultural Studies*, and she has co-edited various publications including the eight country report on *Information and Communication Technologies (ICTs) and Higher Education in Africa* commissioned by the Centre for Educational Technology (CET) for the Educational Technology Initiative of the Partnership for Higher Education in Africa (PHEA).

David T. Stern is Vice Chair for Professionalism in the Department of Medicine at Mount Sinai Medical School. Dr. Stern received his bachelor's degree in anthropology from Harvard University and his medical degree from Vanderbilt Medical School. He completed internship and residency in internal medicine at Tufts/New England Medical Center. He subsequently served as a fellow in Ambulatory Care and Research at Stanford and the Palo Alto Veterans Affairs Medical Center, and received his PhD from Stanford University School of Education in curriculum and teacher education. He served as Director of Standardized Patients, Co-Director of the Patient-Doctor course, and founding director of the international office, Global REACH (Research, Education and Collaboration for Health), at the University of Michigan.

Dr. Stern is a practicing general internist with a longstanding commitment to improving the quality of medical education locally and internationally. His early research focused on identifying when, where, and how doctors learn professional behaviors. He subsequently studied how to measure professional behavior for evaluation, certification, and prediction of future behavior. He is the author of over 100 abstracts and papers on the topic, and is editor of "Measuring Medical Professionalism," published by Oxford University Press in 2006. He has served as a consultant and visiting professor at medical schools nationally and internationally, conducting workshops and seminars on teaching, learning, and evaluating professionalism. In his current position at Mount Sinai School of Medicine, he is working to improve patient care outcomes by ensuring the professional behavior of physicians.

In 2001, he was invited to participate as a member of the Core Committee of the Institute for International Medical Education and their project to evaluate outcome competencies of medical schools internationally. For the IIME pilot project in China, he directed the IIME task force on assessment, organized and managed faculty workshops, and organized the test administration in 2003. Subsequent international panels for standard setting at the student and school levels have helped the IIME to achieve its goal of measuring outcome standards in medical education. He is now President of the Institute for International Medical Education, an independent non-profit institute.

Combining his commitment to medical education and global health, Dr. Stern and colleagues at the University of Michigan recently developed a project to convert all educational materials (lectures, videos, e-learning tools) from the medical school to an open format for use in developing countries. He is working with educational leaders from developing countries to co-create electronic educational materials that could facilitate the scaling-up of healthcare workforce.

Appendix 2: Potential Content Areas

To establish a preliminary understanding of both the current expertise and the curricular needs at the participating institutions, we asked each university to provide a list of potential project areas. This list will be used as the basis for collaboratively determining the projects for 2009. We anticipate narrowing the list to between five and ten OER content projects in total across the partners. Among the criteria for selecting content projects will be the ability to implement the materials in authentic learning environments during 2009 and the ability to develop research-derived evidence of the effect on learning outcomes. Thus, the focus at this stage will be on implementing and evaluating OER-supported learning experiences and not on publishing entire sequences or courses.

Kwame Nkrumah University of Science and Technology
- Pharmacology - this course is taught to every student in the College of Health Sciences. Classes are large and new ways of delivering content in a format that will enable students to have unlimited access to the material will be the main objective.
- Clinical Skills Demonstration - this aspect of the project will seek to record demonstration of techniques in history taking, physical examination, and clinical procedures by clinical experts and made available to students for review and practice in their own time. It will involve teachers from the major clinical disciplines.
- Clinical Microbiology - the aim here will be to link theoretical concepts with clinical microbiology using case studies. It will be especially useful for large class instruction in the face of limited tutorial time and small number of lecturers.
- Sports and Exercise Science - Posture and its implications for health and fitness will be demonstrated to students using appropriate media. This will enable students to appreciate better what they are taught in class.

University of Cape Town
- Proposed to be designed in 2009 as part of a PhD: "Design and develop electronic resources that specifically address fundamentals of general physiology (for example Cell Biology, Muscle, Nerve, Bone, Immune System) required by entry level Health and Rehabilitation Sciences (i.e., physical- and occupational therapy) students. These resources will likely consist of a theoretical textual basis alongside a program of interactive quizzes, assignments, tutorials, 3-dimensional/video representations."
- Almost developed but will need to be formatted in a way so that it can be shared: "A video to demonstrate how to conduct a normal birth is being produced and is in the final editing phase. The aim is to depict not only how to do a delivery but also how to treat or care for the patient during labor from a professional behavior point of view, focusing on teaching newcomers to obstetric practice. The aim is to provide a comprehensive training module that includes all aspects of a pregnancy, birth, and postnatal care. This module could be created collaboratively. The birth video is the first step towards creating a series of videos that together would ultimately cover the whole spectrum of care of a pregnant woman."
- To be developed in 2009: "Creating videos for teaching clinical neurology, focusing first on common straight-forward scenarios - teaching by case based studies using video as the main information stream. The intention is also to expand the concept into all levels (i.e., post graduate neurology and medicine as well)."
- Content that could be formatted as OER: "The content would be in the general areas of Assessment, Innovation and Management of Healthcare Technologies and Infrastructure (AIM-HIT). This includes healthcare technology planning and regulation, medical device innovation, integrated healthcare resource management, healthcare delivery optimization, asset management, risk management, etc. The material includes notes, PowerPoint slides, audio streams/podcasts, references, and computer-based models and tools. We have, arguably, a world-leading package of content and experts as part of our program, and are very keen to collaborate with African universities/academic institutions."

- Potentially a resource that could be formatted as OER: "Two staff members are currently working on an electronic learning resource in Dermatology."

University of Ghana
- Demonstration videos on clinical skills to include history taking, physical examination (adults and children), and clinical procedures.
- Case studies on specific diseases in medicine and dentistry.
- Clinical photography - in ENT (Ear/Nose/Throat) where demonstration of minute structures to students is difficult.

University of Michigan School of Dentistry
- Oral Pathology: A series of case studies that includes clinical images (intraoral and facial photos), radiographs and microscopic images and descriptive text including diagnosis, patient demographic and suggested treatment. These case studies will be gathered and documented by Associate Professor Nisha D'Silva and Clinical Associate Professor Paul Edwards.
- Prosthodontics:
  - Nine lecture recordings
  - Nine lecture slide sets
  - All slides from the nine lectures saved as PNGs, uploaded, tagged, and searchable online
  - 12 implants videos
  - 12 prosthodontic videos (creating dentures)
- Basic Dental Procedures: A number of procedure videos (estimate 25-50) by Ken Stoffer
- Periodontics: Slides from Dr. Sigurd Ramfjord, an international leader in periodontics (approximately 750)
- Genetics: Six case studies from the "Genetics Education in Dentistry" series developed with funding from the National Institute for Dental and Craniofacial Research Grant # 5R25 DE015350-02.
  - Ameliogenesis Imperfecta (two cases)
  - Ectodermal Dysplasia
  - Congenital Periodontal Disease
  - Tooth Trauma
  - Dentin Dysplasia Type II

University of Michigan School of Medicine
The U-M Medical School is already committed to publishing its pre-clinical lecture materials. These are additional efforts being proposed.
- Replacement of copyrighted images used in anatomy labs with U-M dissection photos made available as OER.
- Collaborative co-creation of an infectious disease course.
- Conversion of histology image collection to OER.
- Looking to collaboratively develop innovative assessments for use in self-regulated learning, outcomes-based educational pilots.
- Conversion of Professional Skill Builder to OER: "The Professional Skill Builder (PSB) is a set of web-based case simulation modules that focus on the development of history-taking, physical examination, and technology and case management skills, targeted at beginning and intermediate learners. The material is delivered in a highly interactive, realistic, multimedia environment, under the direct guidance of a clinical mentor as each case unfolds. Students interact with clinical cases by selecting the most appropriate questions to ask each patient, physical exam maneuvers to perform, and the most effective and cost-efficient means of diagnosing the condition portrayed, complemented by targeted decision-support tools along the way."

University of the Western Cape Faculty of Dentistry
- Oral Pathology
  - Exchange of undergraduate teaching material
    - PowerPoint presentations of lectures
    - PowerPoint presentations of OSCE material
  - Exchange of graduate teaching material
    - Teaching microscopic slides of interesting cases
    - Illustrated case reports (clinical, radiological, and histological images)
  - Collaborative research projects for undergraduate and MSc students
  - Forensic dentistry
- Oral Biology
  - We will collaborate with regard to the undergraduate curriculum as well the post graduate program. The main intention is to introduce molecular and cellular biology.
  - We will also evaluate the present course to see whether the contents can be improved on and in so doing add value to the dental program in general.
- Dental Materials Development and Update
  - The current lecturer has a substantial archive of Dental Materials education material. She has resigned and will be replaced by a new lecturer (as yet unspecified). The suggestion is that funds be used to support the new incumbent so that s/he has time to familiarise him/herself with the domain, and personalise and update this archive. This activity might be done in collaboration, possibly through supervised expert support with experienced Dental Materials colleagues from the University of Michigan.

University of the Western Cape School of Public Health
- Developing Resources for Public Health Teaching
  - Development of a global repository of Public Health case studies based on empirical observations, pooled together by partner institutions in Public Health. A global repository is anticipated of scenarios and cases that could be used for teaching in Problem-based Learning settings. Examples might be scenarios in which students could plan program interventions, thus engaging skills in data interpretation, planning, health promotion, prevention, and management skills. Since contributions to this repository will be from different partner institutions in the OCWC, the pool of cases could comprehensively cover diverse topics in Public Health. This is especially relevant given the need for interactive teaching material that is drawn from locally relevant contexts for the learner.
  - Collaborative development of a number of modules which are felt as gaps in the SOPH curriculum in which SOPH has some expertise, but insufficient time to develop whole modules, or insufficient capacity, e.g. in communicable disease control (malaria, HIV/AIDS, TB), Health Informatics, the biological basis of disease, advanced epidemiology, maternal and child health, quantitative research, or qualitative research. SOPH's model for such development to date has been co-curriculation and teaching on a face to face short course over five days followed by collaborative materials development.
  - "Buy out" of lecturer and materials developer time could equally facilitate SOPH subject specialists to devote time to developing open education resources.
  - Promotion of less subscribed SOPH elective modules by offering them in the OpenCourseWare medium (e.g. , alcohol and drug, chronic pain, non-communicable disease control).
- Practice-based learning simulations to develop competence of District Managers using the computer as a learning environment. The development of district health managers' competences is a challenge facing education institutions in Africa, and is best achieved through practice-based education. This is however costly and takes personnel out of their workplaces for extended periods. It also requires sufficient practice sites to which students can be assigned, with minimum disruption to the services. Furthermore, it requires role models of good practice at such sites and, afterwards, mentors; such

expertise is however scarce in these contexts. It has been suggested that computer-based simulations can provide an alternative to the real-life setting, without sacrificing the authentic context. This seems to be an opportunity that should be further explored, if the importance of practice-based learning within the curriculum is accepted.

- Teaching aids and equipment: The SOPH has a new building at the UWC which is still to be equipped. Provision is made for video conferencing or filming of contact sessions in a telematic studio. Support is needed in planning and equipping this unit with technology which would best support the academic program. Visual and sound devices such as video recording cameras, microphones amongst others are needed. It may be possible to host a OER production studio in this site.

Appendix 4: Management Plan

This project will run in a collaborative fashion with the provosts and deans of the participating institutions, or their designees, providing advice and input to the project managers (U-M and OER Africa). Each university has also been asked to provide a part-time project coordinator who will facilitate communication within his or her home institution and liaise directly with partner institutions. Throughout the document, the roles of U-M and OER Africa are articulated. The following summarizes the major responsibilities.

OER Africa Roles and Responsibilities
As part of the overall project, OER Africa will take primary operational responsibility for the following functions (with conceptual input and advice across all from the University of Michigan):
1. Coordination of policy reviews at Ghanaian (and potentially South African) institutions, designed to remove policy and procedure barriers to OER adoption.
2. Management of the work contributions of participating African institutions to the successful content creation/co-creation/adaptation efforts. This will include, but not be limited to, establishing contracts with the participating institutions, managing collaborative activities between institutions, and ensuring that institutions deliver the results necessary for successful completion of the projects.
3. Development and administration of an African Health OER space on the OER Africa web platform, to facilitate sharing of project results between and beyond participating institutions.
4. Appointment and management of an African external evaluator (based on a set of terms of reference generated jointly with the University of Michigan) who will take responsibility for establishment of a short-term evaluation methodology at the outset of the project, delivery of a mid-project formative evaluation report, and delivery of a final project evaluation report.

University of Michigan Roles and Responsibilities
Michigan's focus will be on:
1. Providing input on the institutional engagement efforts specific to health-related content, based on Michigan's experience during 2007 and 2008. This includes patient privacy, community standards around images, indemnification of faculty members (e.g., when referring to off-label use of drugs), endorsement concerns, and fair use/fair dealing in relation to OER.
2. Facilitating the curriculum-driven decision to identify the portfolio of content projects for 2009.
3. Creation and delivery of dScribe training (including training the trainers for the workshops) and ongoing dScribe mentoring and support.
4. The continued review and improvements of the dScribe workflow process.
5. Provision of the OER software tool and requirements gathering for its further improvement.
6. Provision of discipline expertise as needed for the faculty development workshops.
7. Participating directly in the content development through faculty engagement in Africa (Dr. Engleberg) and remotely.
8. Publishing resulting OER materials through international repositories (e.g., MedEdPortal).
9. Coordinating the consultant work on the design of longitudinal studies of faculty productivity and student learning outcomes.
10. Undertaking the analysis and feedback on the socio-technical aspects to inter-institutional collaboration.
11. Defining the vision and documenting the logic model for a scalable, sustainable, Global Health OER initiative.