

Case Study:

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Health OER: Lessons from Kwame Nkrumah University of Science and Technology



Health Open Educational Resources
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Abstract

Information and communication technology (ICT) offers the opportunity to innovate on course content and teaching methods in order to enhance the quality of teaching and learning in tertiary education. One such innovation that was birthed in the early 2000s is the Open Educational Resources (OER) initiative. This paper looks at the experience of the Kwame Nkrumah University of Science and Technology (KNUST) Ghana, with the use of OER for health education. It outlines the processes employed in the development and use of OER, its potential role in enhancing teaching and learning in a developing country, the costs and benefits as well as the way forward.

OER was introduced to faculty of the College of Health Sciences, KNUST in 2009 through sensitization, policy, and production workshops. A limited number of productions have been made and initial reports suggest that students find them very helpful. Following the initial enthusiasm which saw 12 faculty members out of the 16 present at the workshop volunteering to produce material, there has been a sharp decline in those actively producing OER. This has been attributed to a lack of administrative, technical and infrastructural support for faculty as well as other incentives such as the non- release from regular commitments to make time for OER.

The inadequate ICT infrastructure and the lack of an OER policy limit the accessibility of OER material at the University's repository. This can be seen as a temporary hitch as a policy document is currently being considered for adoption by KNUST. Once implemented, the policy will pave the way for the necessary investments to be made to systematically produce and publish OER throughout the whole University.

OER is seen as an innovative means of improving teaching and learning at KNUST by promoting a more learner-centred approach to teaching and learning and more quality contact between faculty and students. The limited available evidence suggests that students find OER a useful aid to learning tool, though student-teacher interactions are still necessary. Current efforts are patchy and heavily dependent on individual faculty commitment, costing on average 35 man-hours per production. More investment is required to improve the efficiency of production as well as increase the accessibility of published OER material. A more systematic cost-benefit analysis is required. In spite of the challenges, OER has been fully embraced at KNUST and is expected to flourish with time.

Keywords: open educational resources, e-learning, teaching, learning, higher education

Background

The role of higher education is to provide expert training and produce qualified human resource for all aspects of a society's socio-economic well-being. Products of higher education are expected to be well informed and deeply motivated citizens, who can think critically, analyse problems of society and look for solutions to the problems of society (1). Teaching and learning has moved from being teacher-centred to being learner-centred. Varying methods of instruction including lectures, practical sessions, field work, seminars, case studies, problem-solving methods, simulation and project methods have been employed in tertiary institutions to foster this kind of learning where the role of the teacher is as a facilitator and not necessarily a transmitter of knowledge (1).

The information and communication technology (ICT) boom of the late 90s significantly influenced higher education and opened the way for harnessing its strengths to enhance education. This influence ranged from the simplest use of word processing through the use of PowerPoint for lectures to more complex faculty-student interactive simulations. In effect, it changed the way knowledge was developed, acquired and delivered. E-learning was one such educational mode that this era produced (2). In fact, the advent of ICT was expected to positively influence the three fundamental aspects of educational policy by widening access to education, improving quality and reducing cost (3). ICT thus offered the opportunity to innovate on course content and teaching methods in order to enhance the quality of teaching and learning in tertiary education. One such innovation that was birthed in the early 2000s is the Open Educational Resources (OER) initiative. Commonwealth of Learning (4) defines Open Education Resources (OERs) as:

“digitised materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research”.

In a bid to achieve a more learner-centred learning environment, OER has become one of the most well suited educational tools that can facilitate this course or direction. With the materials available to the learner on storage formats such as CDs or pen drives, on the intranet and on the internet, learners can undertake the learning process at their own pace. OER can take various forms including written, audio and video and hence caters for varying learning needs of learners. It can be didactic, illustrative, animated and can also make use of case study and self- assessment learning formats. The availability of OER to learners enhances the teacher-learner interaction time spent in the classroom. While it does not reduce the need for teachers, it ensures that they focus on their facilitative role in the learning process. Access to university-wide, country-wide and even worldwide OER facilitates multidisciplinary learning, as learners are not only limited to their subject area thus fostering a holistic education.

This paper looks at the experience of the Kwame Nkrumah University of Science and Technology (KNUST) Ghana, with the use of OER for health education. It outlines the processes employed adopted in the development and use of OER, its potential role in enhancing teaching and learning in a developing country, the costs and benefits as well as the way forward.

Kwame Nkrumah University of Science and Technology

Kwame Nkrumah University of Science and Technology located in Kumasi, Ghana, has the mission of providing an environment for teaching, research and entrepreneurship training in Science and Technology for the development of Ghana and Africa as well as providing service to the community. The university is made up of six colleges namely the College of Agriculture and Natural Resources, College of Architecture and Planning, College of Art and Social Science, College of Engineering, College of Health Sciences and the College of Science. The College of Health Sciences (CHS) comprises the School of Medical Sciences, the Dental School, the Faculty of Pharmacy and Pharmaceutical Sciences (Pharmacy and Herbal Medicine), the Faculty of Allied Health Sciences ((Nursing, Medical Laboratory Technology, Sports and Exercise Science), the School of Veterinary Medicine and the Kumasi Centre for Collaborative Research into Tropical Medicine. OER was introduced to KNUST through the College of Health Sciences.

KNUST, including the College of Health Sciences has had to deal with an ever increasing number of students, insufficient funding, resource constraints, limited infrastructural capacity, low research capacity, basic ICT infrastructure and inadequate number of faculty members among other challenges. The Medical School for instance, which was originally set up with a maximum capacity for intake of 50 students a year has for the past 15 years enrolled more than 100 students a year with its most recently enrolled class having about 189 students¹. This poses a serious challenge to the quality of products unless resources are expanded and more innovative approaches to teaching and learning are implemented.

The Process

The Health OER Project was funded by the William and Flora Hewlett Foundation and implemented in the College of Health Sciences as part of collaborations between KNUST and University of Michigan, OER Africa and other African Universities in 2009. Sensitization, policy and production workshops were organized for administrative heads and faculty members in February 2009.

The OER concept was received in KNUST with so much enthusiasm that at the end of the first OER production workshop, 14 pilot OER projects were proposed by 12 out of the 16 College of Health Sciences faculty present. The meetings brought together staff from of the CHS, the KNUST library, the ICT Directorate, the Communication Design Department of the College of Arts and Social Sciences among others to work as a multidisciplinary team for the development and use of OER in KNUST with the process being led by the Provost of the College of Health Sciences. The College was assisted in this endeavour by a visiting professor from the University of Michigan who spent one year at KNUST helping faculty with the development of OER.

As Figure 1 illustrates, OER materials are developed then reviewed and finally published with the stages feeding back into each other. This process is facilitated when the appropriate policy environment

¹ KNUST School of Medical Sciences records

governing the development, publication and use of OERs across the university exists. KNUST has drafted an institutional policy which seeks to address issues of human resource, infrastructure, collaborations, publication rights and licensing, technical support, review and quality assurance, access, motivation and rewards and potential liability.

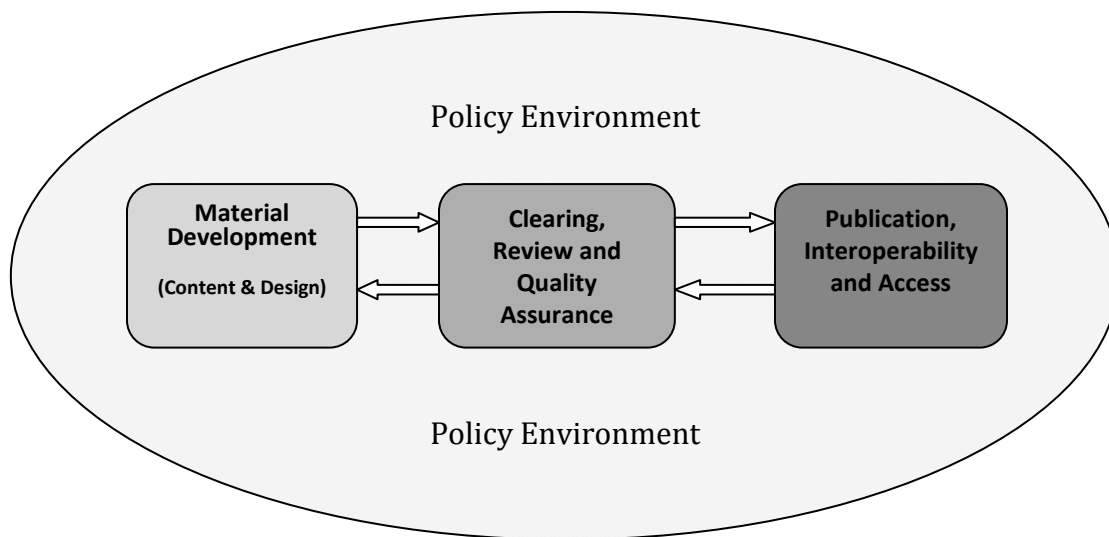


Figure 1: OER Process

Typically faculty members propose the specific subject and type of material to be developed. Media specialists support faculty members to develop OER materials whose content and design are user-friendly and suitable for publication. The clearing team also called dScribes checks the material for possible copyright issues among other things and then clears it before the ICT team publishes it. Examples of completed OER learning modules by faculty in the College are listed in Appendix 1. These can be found on KNUST’s dedicated OER website – <http://web.knust.edu.gh/oer/> – which serves as a repository for the university’s OER materials. Until recently, access to material in this repository was password protected though temporary access has now been granted while the policy undergoes consideration and adoption.

Student Perspectives

At the School of Medical Sciences in KNUST, two narrated animations that explain the polymerase chain reaction (PCR) were distributed to 150 third-year students enrolled in Human Biology (Clinical Microbiology). This topic was chosen because of student feedback on the complexity of the procedure hence the difficulty they face in understanding it in class or from books (Adanu et al, unpublished work). These materials were distributed to students on pen drives and CDs and also made available on the School’s computer laboratory. A survey was undertaken using self administered questionnaires to assess

the student acceptability of the programme. With a 73% response rate, 82% viewed the material. On a 0 to 4 point scale used to rate the usefulness of the material; 4 = “extremely helpful,” 3 = “helpful”, 2 = “neutral,” 1 = “not helpful,” and 0 = “unnecessary”, the average rating for the PCR animation was 3.5. No student rated the programme as “unnecessary” or “not helpful” and only one student rated it as “neutral”. 87% of the students identified the e-learning animations among options such as lectures, textbooks, discussions with peers, as the most important contributor to their understanding of PCR.

The perspectives of students in the School of Medical Sciences in KNUST collated from interviews indicate that OER:

- Complements the teacher-learner interaction instead of replacing it
- Makes the learning of complex scientific processes much easier when audio and visual interfaces are used
- Brings the teaching and learning of laboratory-based and clinical demonstrations closer to the student which does not happen during the actual instruction due to the large number of students
- Facilitates in-class sessions as students are already familiar with the material

Costs and Benefits

Little systematic research has been done on the costs and benefits associated with developing, publishing and using OER in KNUST at this stage and so this section is mostly based on formative surveys and interviews conducted both with learners and faculty in the College. More extensive research on the development and dissemination of OER materials as well as their impact on teaching and learning needs is required.

Producer-side costs are evident in each of the three main processes of development; review; and delivery of OER. It has been observed that the man-hours of faculty required for content development is perhaps the most significant cost associated with this endeavour. The initial excitement of faculty to produce materials waned considerably when the reality of the time commitment required dawned on them. During the first production workshop for instance, 12 out of the 16 faculty present proposed to develop fourteen self-selected OER modules. A year later, only three of the original fourteen had completed their materials. Apart from the newness of the concept, most of the material produced was developed from scratch. Developing a video on the dissection of a frog in the pharmacology laboratory for example, required a 35-hour input from the authoring faculty. This faculty member also spends about 26 hours a week on classroom and laboratory instruction excluding time spent on other required activities such as research, examinations, supervision of student projects, continuous professional development, etc. Also, another 30 man-hours were used for the design and other media aspects of the production. The clearing and web teams also spent 8 and 4 man-hours respectively to clear, fine-tune, make interoperable and upload the video. One OER video therefore takes faculty and the support team about 35 and 42 man-hours respectively.

Other costs on the producer-side involved sensitization and training of faculty and other support staff, the appropriate human resource i.e. media, web and quality assurance specialists, as well as the administrative and technical set-up required to facilitate the whole OER process in the College. To increase accessibility, additional costs associated with the necessary infrastructure such as institutional repository, hosting as well as bandwidth to facilitate intranet and internet connectivity all apply.

On the user side, learners need access to computers and the internet and probably simple storage hardware such as pen drives and CDs. A survey of 150 third year students in the KNUST Medical School was conducted to assess students' access to computers (Adanu et al, unpublished work). With a 73% response rate, the results indicated that 93% of the respondents had access to a computer for learning purposes with 67% owning their own computers and 24% sharing with another student. It is worth noting that majority of medical students come from relatively well-to-do backgrounds so this may not be representative for the whole university. The College of Health Sciences with over 2000 students has four computer laboratories with a total of 93 computers. There is therefore the need to expand the computer laboratories to increase student access to e-learning and OER.

The biggest benefit of e-learning and the introduction of OER to the College of Health Sciences has been the improvement of teaching and learning. Using videos, animations and other illustrations to produce e-learning materials in the teaching of health sciences makes the processes easier to understand (5-7). Through the use of the pilot OER materials, this has been made evident in the College. As mentioned earlier, an enhanced and more innovative approach to teaching and learning has become more imperative in KNUST due to the increased number of learners and the limited human and material resources available for their education. These challenges risk negatively affecting the quality of the learning experience for students and OER has a role in preventing a decline in quality. Combining the traditional in-class learning environment with OER will result in more quality contact between learners and faculty and enhance self-learning.

With OER, KNUST is further contributing to the global knowledge base as well as gaining from the work of others. This sharing of OERs is especially useful as KNUST's repository and access to print and electronic learning materials is inadequate. KNUST, University of Ghana and University of Michigan currently share their OER materials and so each institution uses its limited resources to focus on different areas thus avoiding duplication of effort and fostering cost-sharing in the production of e-learning materials. Indeed, KNUST is currently a participating member of a Health OER Network to foster sharing of health e-learning materials between participating institutions across the world.

Way forward

The lessons learned from the pilot implementation of OER in health education in KNUST have revealed its enormous potential in higher education. A lot more can be done to fully harness the contributions that OER can make to teaching and learning in this university. Currently, all the e-learning materials produced for OER are singular learning modules, specific topics and procedures selected by the authoring faculty. In addition to this current mode of selection of content for OER production, KNUST

must systematically and in phases produce open courseware covering the entire curricula of its taught programmes. OER production must move from being a “hobby” for interested faculty to a well supported and programmed activity of the University with the provision of needed resources, establishment of a robust clearing and review system, faculty time allotment system and a reward system. The reward and time allotment system will ensure that the development of OER is treated as important as the other duties of faculty such as research and hence is accorded the appropriate time and reward.

The inter-disciplinary collaborations such as the one between the College of Health Sciences and the College of Art and Social Sciences need to be promoted so that the skills and resources of all Colleges are harnessed to support this initiative. Also, through sharing with other institutions and the participation in open education networks, faculty will develop both new and revised materials through the blend of local and global inputs to enrich their quality and scope of the university’s e- learning materials.

Though KNUST is already pursuing an open access agenda through its DSpace (digital institutional repository of its scholarship), the publication of quality OER will boost this course of action. Both the authoring faculty and the university will gain recognition and increased visibility for their scholarship. Indeed, one of the resultant effects of these benefits will be the attractiveness of the university to potential students and its influence on their eventual choice of a university.

Though KNUST is a public institution, the attractiveness of its programmes (both regular and distance-based) to applicants of its fee-paying programmes as well as foreign applicants will boost the revenue generation capacity of the university. Indeed, one can say that this argument is speculative at this point but empirical evidence from MIT suggests that it is a realistic expectation. In a survey conducted by MIT in 2006, they found that 35% of Fall 2005 entering freshmen who were aware of MIT Open Courseware prior to attending MIT, indicated that the site was a significant or very significant influence on their choice of school (8). Freely available teaching materials can therefore influence both the choice of school and the choice of programme by prospective students. These materials will not only be useful for prospective and current students but can become a source of continuous professional education. Health workers for instance can easily enhance their continuous medical education through the use of OER. Still using the example of health workers, KNUST can build upon its wide range of electronic educational materials to design and run continuous medical education courses which can serve as a revenue generating venture. Indeed, the impact of revenue generation will only be an added bonus to the fulfillment of the institutional goals of KNUST. The ultimate goal of higher education is to link people into learning communities (6) and KNUST is working towards becoming such a learning community through its full open access status.

Attaining such a status however, comes with its attendant costs. Investments in the engagement and training of human resource as well as the necessary administrative and technical infrastructure will be required. Faculty will need to be sensitized and trained on the process of developing and using OER as well as the related policy and pedagogical issues. Media specialists, intellectual property researchers, web design and maintenance team and library staff will need to be engaged and trained to support

faculty in their development and publication efforts. The required administrative and technical set-up to facilitate the process will include offices, media studios, video and audio recording equipment, servers, computers and the requisite software as well as intranet and internet connectivity issues. The benefits to be derived from a well established OER system is expected to more than compensate for the investment made. KNUST can explore various funding models to ensure the establishment and sustainability of the OER scheme in the university.

Conclusion

The advent of e-learning and OER on the educational scene has opened the door to enhanced teaching and learning in tertiary institutions. KNUST is beginning to experience the benefits of incorporating e-learning and OER into its educational practice and the timing of this initiative could not have been better as the university continues to face increasing student numbers and limited human and material resources. Augmenting the traditional methods of instruction with the use of e-learning and OER through a health education pilot indicated valuable enhancement in teaching and learning at the higher education level such as promoting a more learner-centred approach to teaching and learning and more quality contact between faculty and students. OER has been embraced wholeheartedly at KNUST. The limited available evidence suggests that students find OER a useful aid to learning, though student-teacher interactions are still necessary. Current efforts are patchy and heavily dependent on individual faculty commitment, and cost on average 35 man-hours per production. More investment is required to improve the efficiency of production as well as increase the accessibility of published OER material. A more systematic cost-benefit analysis is also required. With the essential investments in human resource, training and infrastructure, KNUST will not only improve the quality of its products but also contribute to the global knowledge base and increase its visibility and attractiveness. According to Article 26 of the Universal Declaration of Human Rights, everyone has the right to education (9). Caswell and colleagues (10) rightly state that we now have the legal and technical tools to convert a 60-year-old declaration into a reality through open educational resources. KNUST has taken its first steps towards becoming a resourceful learning community not only for its own faculty and students but for all.

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APPENDIX 1

Completed OER Materials in KNUST by Field of Study

Internal Medicine	Buruli Ulcer Interpretation of Automated Blood Counts Clinical Chemistry: Glucose Tolerance Test
Microbiology	Clinical Cases in Microbiology Laboratory Methods in Microbiology Introduction to Virology
OB/GYN	Examination of the Pregnant Patient
Behavioural Science	The Mental State Examination