Exploring Three Approaches to Offer Distance Learning Courses through a Social Network of Health Researchers in Three African Countries

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Abstract: The Institute of Tropical Medicine in Antwerp hereby presents the results of two pilot distance learning training programmes, developed under the umbrella of the AFRICA BUILD project (FP7). The two courses focused on evidence-based medicine (EBM): with the aim of enhancing research and education, via novel approaches and to identify research needs emanating from the field. These pilot experiences, which were run both in English-speaking (Ghana), and French-speaking (Mali and Cameroon) partner institutions, produced targeted courses for the strengthening of research methodology and policy. The courses and related study materials are in the public domain and available through the AFRICA BUILD Portal (http://www.africabuild.eu/taxonomy/term/37); the training modules were delivered live via Dudal webcasts. This paper assesses the success and difficulties of transferring EBM skills with these two specific training programmes, offered through three different approaches: fully online facultative courses, fully online tutor supported courses or through a blended approach with both online and face-to-face sessions. Key factors affecting the selection of participants, the accessibility of the courses, how the learning resources are offered, and how interactive online communities are formed, are evaluated and discussed.

1. Introduction

It is essential for health-care workers operating in low-resource settings (LRS) to be able to access educational material, as well as accurate and up-to date information, whether it is through distance learning courses, or through continuing medical education modules. AFRICA BUILD (AB) is a Coordination Action project under the 7th European Framework Programme (Grant Agreement no. 266474) [1]. Its mission is to "improve capacity for health research and education in Africa, through Information Technologies" and to provide innovative opportunities in learning and research (the complete list of partners is available in the footnote[1]).

Well-documented examples of eLearning experiences in Africa are limited, particularly in the field of evidence-based medicine (EBM) [2]. In order to provide evidence of the feasibility and operability of such courses in the African context, AFRICA BUILD focused on the development, implementation and evaluation of two pilot courses in the areas of HIV/AIDS and reproductive health research.

To identify the most appropriate and effective approach to delivering those two health research courses in LRS, three different approaches were employed in different settings. The first approach was tutor-based but was fully delivered online, the second was fully facultative and fully online, and a third was through blended learning: online and face-to-face delivery of the training content. The courses were run at partner institutions in Ghana (in English), Cameroon and Mali (in French). The students were postgraduate medical students at the partner institutions. Evaluation of these pilot courses provided evidence supporting the feasibility and sustainability of distance learning courses in Africa and informed on the possibility of future inclusion of the courses in respective postgraduate or PhD training programs.

1.1 HIV/AIDS Research Pilot Course

This training programme was designed to train health-care workers. It aimed to equip them in applying evidence-based medicine (EBM) in their clinical practice [3]. It also sought to enhance the participants to start implementing clinical research and/or engaging or working at a policy level and expecting to get involved in generating policy recommendations based on existing evidence [4].

The HIV/AIDS research pilot course consisted of three consecutive modules. The first covered EBM applied to a clinical research question that sought to resolve a clinical problem (formulating a research question, finding evidence to answer it, and critically appraising and grading the evidence identified). The second module connected the evidence found with policy-making (that is, putting the evidence into practice and formulating recommendations). The third module focused on missing evidence (how to approach a research question that cannot be answered) and questions on which new research is needed.

One pilot exercise was tutor-based, following a course schedule in which new learning resources were released. A main objective of this pilot was to create a community of participants and course facilitators, enabling interactions between participants and their peers and between participants and more experienced course facilitators at their home institutions. A second time the same course was offered as a fully faculty-supported online learning resource with the aim of supporting research carried out by Master of Public Health (MPH) students. A content matter-expert introduced each module (and each step of the process, from finding evidence to the start of the clinical research) using a recorded

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video webcast on consecutive weeks over a three months period. Each step was discussed within a virtual community. The course centered on solving a clinical problem and an exercise with one clinical problem was carried out over the entire course period. Smaller groups of students discussed the this exercise as a group activity. A more experienced researcher, called "eFacilitator", provided support to the course participants.

At the end of the online course the students' performance was evaluated. The students and teachers also evaluated the format and content of the online course. Face-to-face feedback was provided to the students in order to consolidate the main points of the course. Finally, a face-to-face workshop on scientific writing was provided by an expert facilitator from the World Health Organization with the aim of helping students with writing research proposals on topics that were identified in the course as needing further research.

1.2 Reproductive Health Research Pilot Course

This training programme was designed for postgraduate public health and clinical scientists enrolled in a PhD program. Contrary to the previous two experiences, this time a blended approach was piloted, where online learning resources were used in the preparation phase, together with individualized study material, finally leading to a face-to-face moment when students and teachers came together.

This pilot course comprised two modules, which could be taken separately. The first module presented five different research gaps in reproductive health. In each session, through a recorded video webcast by a subject matter-expert, a research topic in reproductive health was covered. After the webinar session, questions could be asked by the expert through an online forum, where also thematic discussions were initiated and articulated by the subject matter-expert. The topics covered during the five weeks of the course were:

- Adolescent sexual and reproductive health
- Fertility regulation
- Gynecology
- Pregnancy and childbirth
- Sexually transmitted diseases

A second module, developed by WHO, went through all EBM steps, but this time applied to reproductive health topics and knowledge gaps. Again a clinical problem was identified and all steps were applied with the objective of finding evidence and applying the evidence to practice through group work. Again, eFacilitators supported students in going through each step of EBM course and provided feedback on the content. A final assignment for the students was to apply these steps of EBM to their Master's in Public Health thesis topic.

2. Objectives

The specific objectives of these two AFRICA BUILD pilot eLearning courses were:

1. to deliver a specific training program in the field of HIV/AIDS research;
2. to deliver a specific training program in the field of reproductive health research;
3. to evaluate and analyze results of the demonstration training programs.

The specific learning objectives for the HIV/AIDS research pilot were:

1. Identify an appropriate research question
2. Select an appropriate study design, including study population and statistical tests
3. Retrieve published articles relative to the research question

4. Critically appraise relevant published clinical research in relation to specific research question for scientific correctness and soundness and its relevance in a concrete low resource setting context
5. Determine the level of evidence presented in the article
6. Evaluate available evidence for theoretical applicability in clinical reasoning in a concrete setting
7. Outline a research proposal
8. Identify the current best practice and most up-to-date research in the area
9. Formulate a set of clear and practical evidence based recommendations

The specific Learning Objectives for the Reproductive Health Research Pilot were:
1. Formulate clinical answerable questions
2. Search effectively for evidence using tools such as the WHO Reproductive Health Library (RHL)
3. Critically appraise clinical evidence for its validity and applicability
4. Understand basic effect measures such as Relative Risk and Numbers Needed to Treat

3. Technology Description

Hardware and software required to access the AFRICA BUILD Portal (ABP) were:
- An Internet connection that is at least 28.8 Kbps
- A monitor set to 800x600 pixels or more
- A web browser (any between: Chrome, Firefox, Internet Explorer, or Safari)
- Adobe Acrobat Reader

Learning resources consisted of webcast tutorials and reference reading material in SCORM (Sharable Content Object Reference Model) packages, pdf format, or Google documents formats. Tutorials were recorded in HTML5 format with Dudal – a webcast recording and streaming application used by the RAFT network for continuing medical education over the Internet, in French- and English-speaking Africa [5]. Moodle was chosen as the Learning Management System (LMS) to monitor students' performance and to track their progresses and outcomes. Moreover, Moodle supports SCORM as standard format package for publishing contents on the web. All the LMSs that support this standard can recognize the contents and track and record every interaction of the students. Notably, all material developed in SCORM can be reused in any other LMS that supports the same standard.

The learning resources were placed on the course page and linked to a Moodle discussion forum, where course participants could discuss specific topics with input of the course facilitators or content from the subject matter-experts, who recorded the lectures. Learning outcomes of the acquired knowledge were evaluated through mobile-based multiple-choice questions (pre- and post-test) issued at the beginning and end of each module.

All these resources were available in a social network-like platform, the Africa Build Portal [6], which combined content and social networking features to enhance interaction between participants, their peers and course facilitators.

Several functions were activated on the Moodle discussion forum which were chosen as most appropriate for LRS, granting more asynchronous interactions, such as:
- an internal e-mail account available for direct contact between students and teachers/subject matter-experts, facilitating the exchange of recent literature, policy documents and interaction from/ between sites;

- a system of alert messages, giving early notice on what is available in the forum on the personal e-mail box and which enabled the community members to interact directly using e-mail;

4. Designing the evaluation of the first pilot courses

Through the courses described above the students earned and applied the steps of EBM, from the definition of a specific clinical research question and design of a search strategy to the interpretation of the evidence and the application of the latter into practice, linking the detected gaps to possible research topics within the fields of HIV/AIDS and reproductive health. In addition to that, another crucial component of the AFRICA BUILD Project has been to create virtual communities of researchers within Africa who can continue to develop research ideas, exchange information and knowledge regarding new tools and evidence [7].

When evaluating the courses, we not only looked at how the EBM skills have been taken up by students, and how they have experienced this, but also if and how online communities could be initiated and maintained between course participants. We assessed those objectives in a quantitative and qualitative manner.

4.1 Quantitative

We looked both at what course participants told (in surveys) and did (statistics on page views, and pre- and post-course assessments):

- Comparison of the participants' performance on a test before starting the course, and a test at the end of the course. Both tests were based on case examples.
- Appreciation of course participants and teachers in an online survey at the end of the course.
- Attendance statistics of the learning platform and the video-recorded sessions using Google Analytics.

4.2 Qualitative

Through a focus group discussion and interviews of content experts and facilitators the following indicators were assessed:

- Perception of students and teachers on the online course and its impact on research practices (focus group discussion).
- The impact of the online course as a preparation to face-to-face exercises, on participants' performance on the exercises.
- Added value of creating an on-line community of researchers and feasibility of maintaining a network of researchers through such an online community.

Since the same courses were offered through three different approaches – online facultative, online tutor based, and blended online and face-to-face learning; we could also assess differences in the outcome between those approaches.

The courses were intended for either clinical or public health researchers linked to a research institution such as a university or a large hospital, or for other health care workers with an interest in doing clinical research who are not part of an institution carrying out research, and who could be located in more remote places. However, due to feasibility issues, the majority of participants starting these first pilot courses were based at a more central level, linked to a research institution. In all three approaches we experimented with, the participants had similar profiles, which allows a comparison between the ways the courses were organised.

5. Results and lessons learned

A majority of the participants in the HIV/AIDS pilot courses were medical doctors (85%) working in a hospital (58%), while less than one third (27%) working in a health center; 91% of them had experience in HIV care, and 41% were involved in providing capacity building in their own institution (on average at least one session per month). For the reproductive health pilot course, all participants were public health scientists, as this course was piloted and integrated in the public health PhD programme. A careful selection of course participants, for whom the courses are really relevant, in need of developing EBM skills, was a key factor for successful courses. Assessing the level of the prerequisites for the participants before enrolling into a course, through an entry test or by a selection at an institution was favorable for course retention and course appreciation.

The proportion of participants who scored at least 60% (or more) on a test case study after the course was 95%, compared to 47% who scored over 60% on the test before start of the course. The average score went up from 45% (n=35) to 74% (n=35).

Attendance of the course sessions, video webcasts, as expressed in unique page views by course participants, varied according to the subject and to the presenter, from 50% (19 of the 38) for the least consulted session as compared to 100% (38/38) for the most viewed session. Sessions with a link to the exercises were much more attended than those that were solely tutorials. Attendance to the tutor- supported course was much correlated with the course tutor's efforts to communicate with the participants and other actions (such as emailed feedback on exercises, and/or an introductory session organized by an IT person) undertaken to get participants to attend the class, During the blended learning course, most participants accessed the online learning resources when working face-to-face with their peers on exercises in which the online theory was applied. In such setting online learning resources were good reference material.

When asked what were the main factors encouraging participants to complete the course, all agreed that content was the most important factor, but at one institution, where facilitators from the home institutions actively engaged the participants into online discussions, these facilitators were considered the highest motivators.

The majority (30 of the 33 responding to the survey) would recommend this course to colleagues, and 67% expected to transfer some of the EBM skills learned to other colleagues.

As many as 67% of the participants indicated they would be willing to continue the interactions with their peers after the course ended in an online virtual classroom or a so called community of practice [7-8]; 30% stated such interactions would be interesting, but it may not be feasible to participate actively. Only 3% were not interested in staying connected. However, although intentions were made, the few online interactions that took place after the courses ended were between participants who had met in person during a face-to-face part, or at their home institutions. To keep participants on board in an online community, there needs to be "something in it" for the participants for taking part in such online interaction. Facilitating these community discussions by the assigned persons bringing in new content or learning material is likely to prove to be effective.

Although webcasts were recorded in a format particularly designed for low bandwidths, and that the majority of the participants were not based in the most remote places, Internet connectivity remained an important barrier to following the online courses. Of the questioned participants, 72% (24/33) still encountered some problems linking to internet connectivity, but only 19% had problems to finally open one or more of the webcasts.

Almost all the participants did not consider language a barrier, because the pilot courses were offered only to participants speaking the course language (French or English).

Searching literature and assessing the quality of evidence, two important EBM steps, would require sound knowledge of English.

The key lessons learned we found from these results stated above and the interviews and group discussions following the pilot courses are summarized in Figure 1. The main factors we found contributing to successful EBM online courses were a good selection of participants, who enrolled for the right reasons to the course, and who needed EBM skills for their own research or clinical practice, tutor support or interaction with course facilitators who were people experienced with the skills of EBM, and finally IT support. The courses being free of charge, relying on voluntary enrollment of participants, and not offering accreditation for the course as part of any (post)graduate programme are barriers we would try to overcome in the future. Also engaging course tutors over longer periods could be a limitation in the future when the project is not directly financially supporting a tutor.

To overcome the need of a tutor "pulling" the fully online courses, we started offering courses through a different format, creating a community of practice around a specific topic, where starting from an introduction to a topic, researchers enrolled on the community share and exchange their own knowledge and experience related to that topic with peers from different countries or working in different contexts[8]. This can happen online in groups on the ABP. When an increasing number of researchers are enrolled to the ABP, more interested participants can be informed of such thematic discussions, and enroll on one community of practice. Also the "blended" approach, where the online courses are integrated into an existing face-to-face program, is not limited by the above limitations. Such "blended" courses are foreseeable in the future, and offer an entry point to the ABP for (post)graduate health researchers.

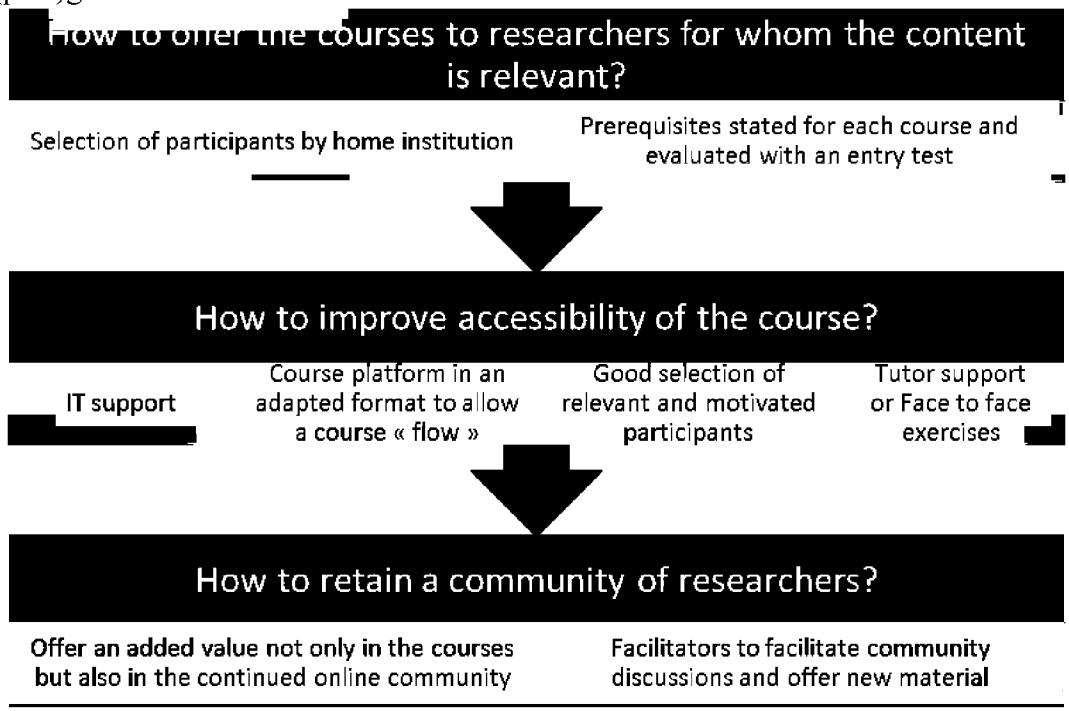

Figure 1. Main lessons learned from the 3 pilot courses run on the Africa Build Platform: critical factors contributing to a successful distance learning course

Subjects that were not offered, but that course participants did ask to include were: statistical analysis of research data and/or published evidence, sampling including sample size calculations, scientific writing and how to elaborate a budget and the planning of a research proposal.

6. Conclusions

Online courses can be rendered useful for course-takers in the African setting when the course content is strongly linked to the needs of those taking the course. For example, in our pilot courses the student or researcher taking the course needed EBM learning and the related exercises to develop research proposals for their Master's and PhD courses. Therefore, integrating the online courses in PhD or postgraduate degrees is most promising if aiming at connecting peers and retaining them over the entire duration of the course.

Course attendance is enhanced when facilitators with good communication skills communicate with the students and encourage them to continue to participate. Also, it is important to build challenging exercises in the course content in order to involve the students. Discussions of the experiences and feedback from facilitators can also be important in keeping the students engaged. At least in the African setting, two factors point to the importance of some face-to-face interaction. First, the courses with the mixed online plus face-to-face format achieved better participation and acceptance. Secondly, the online continuation of communities of practice was prolonged when people knew each other in the real world also.

From the Africa Build experience we also learned that IT support is vital to ensure smooth and continued interest in online learning. Ordinary users of online content need IT support as glitches can occur. One of the weaknesses of our experience is that the participants in our pilot courses were in the main cities in their respective countries and we could not test the efficacy of online learning for those truly in isolated low-resource settings.

Finally, in our courses training content came out of experiences of several international academic institutions. This may have contributed to maintaining an interest in the offered courses. It would be interesting to see how effective the same courses would be if they were done on a 100% local basis.

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