

CONTINUING MEDICAL EDUCATION THROUGH MOBILE DEVICES FOR HEALTH CARE WORKERS IN DEVELOPING COUNTRIES

Inge de Waard

*Institute of Tropical Medicine
Nationalestraat 155, 2000 Antwerpen, Belgium*

Maria Zolfo

*Institute of Tropical Medicine
Nationalestraat 155, 2000 Antwerpen, Belgium*

Carlos Kiyán

*Institute of Tropical Medicine
Nationalestraat 155, 2000 Antwerpen, Belgium*

ABSTRACT

This paper focuses on delivering mobile continuing medical education (CME) to health care workers (HCWs) in developing countries. Delivering mobile content to remote areas in low resource settings is a technical challenge. However the need to transmit the latest knowledge on Anti Retroviral Therapy (ART) is crucial for HCWs involved in HIV/AIDS care in high burden areas.

Through the development of accessible and standardized mobile content on ART we can reach many more HCWs in the field. Although standardization of mobile content is only in its infancy, we have applied the guidelines for mobile content development of the Mobile Web Initiative. This has resulted in increased accessibility of the CME modules, minimized download size of the content and enabled us to reach as many different mobile cell phones as possible. The cost of downloading content and enabling cheaper cell phones to connect to the CME modules were crucial in opening up the CME modules for HCWs in developing countries. In addition to this approach, we have been developing mobile multimedia content as well, anticipating future mobile applications in developing countries.

Because the CME modules were integrated in a bigger educational portal, it had and has a beneficial result on the combined knowledge exchange of that portal. Mobile CME modules also contribute to the body of knowledge sharing and capacity building in developing countries.

KEYWORDS

mLearning, CME, Lifelong learning, Developing countries

1. INTRODUCTION

There is limited access to information and teaching resources in developing countries and a great need to enhance learning and teaching environments, enabling health care workers (HCWs), with little or no conventional access to the Internet to interact and gain knowledge. Mobile learning can be a solution and it allows us to contribute to the body of knowledge sharing and capacity building in developing countries.

In order to facilitate physicians involved in HIV/AIDS care to access the latest knowledge in HIV treatment a knowledge platform has been set up in 2003: Telemedicine. Started as computer aided program on management of HIV/AIDS difficult clinical cases, through a web-based discussion forum free and accessible to all HCWs interested, it has been shaped more recently in a knowledge portal where CME are delivered. Both the knowledge portal and the CME modules are made accessible to mobiles.

The decision to integrate mobile computing into an existing web-based knowledge platform, was a strategic decision. We took into consideration both the context of the learners and professional reality of being out in the field. For this reason we also found a solution to keep HCWs updated through their mobile when a new mobile CME was published.

Since January 2008 the HCWs are reached every month by CME modules developed in a hybrid web-and mobile-format.

The purposes of this mobile CME addition are:

- To facilitate the introduction of high-quality antiretroviral (ARV) care for HIV/AIDS patients living in resource limited settings, by providing remote consultations in the field of ARVs and management of opportunistic infections to clinicians working in the South.
- To provide continuous education in the field of HIV/AIDS care to HCWs based in remote areas in developing countries.
- To take the context of the learner into account.

2. BACKGROUND

The Telemedicine platform is based on user-generated knowledge exchange. The cases are all peer-based and come from HCWs in developing countries in need of second-opinion advice. Between April 2003 (date of the first telemedicine referral) and March 2008 the Telemedicine system received 803 referrals from more than 40 different countries, mostly developing countries. Beside the experts' suggestions a lot of interaction is granted by the same end-users: this exchange of knowledge has provided an extra stimulus to the participating HCWs. With this relevant context they could find an immediate relevance for cases they faced in the field. Additionally they could share their expertise and knowledge with other HCWs around the world.

3. PROBLEM

HIV/AIDS is a rapid evolving field in medicine: news and updates need to reach HCWs as quickly as possible. However, working in low resource settings brings along specific challenges, such as technology and settings.

A lot of HCWs in high burden HIV/AIDS areas do not have an internet connection through a landline, sometimes there is no computer available and in some areas the HCWs do not have (continued) access to electricity to power computers. However most of the HCWs do own a cell phone with limited internet access and with a much longer battery life than computers.

This analysis pushed us to investigate mobile CME solutions for HCWs employed in developing countries.

4. MOBILE SITUATION IN DEVELOPING COUNTRIES

Some developing countries, particularly in sub-Saharan Africa, are by-passing the fixed network telephony to install cell phone networks in rural areas. That offers the opportunity for people in rural communities not only to make phone calls, but to gain the advantages of mobile services such as text and multimedia messaging (Mike Sharples et al, 2007). Another equally important convergence is occurring between the new personal and mobile technologies and the new conceptions of lifelong learning (Mike Sharples et al, 2007).

Additionally many developing countries will move towards the use of distance learning programs avoiding peripheral health stations being left unmanned because of HCWs moving out for short or long training programs, causing a temporary "brain drain". The use of mobile technology offers the unique feature to reach the end-users at the point of care (i.e., out in the field) and to immediately relate to the learners' context (Salden & Poortinga, 2006).

Why would a web-based forum expand to reach mobile users in low resource settings? Generally the level of technology penetration in Africa is low compared to developed countries, primarily because the general population cannot afford it. Cost of a telephone connection in Africa averages 20% of GDP per capita compared to 1% in high income countries (Beute, 2004). However, the arrival of mobile and wireless technologies is rapidly changing this, and beside the cost, the mobile phone is anyway set to play a major role in the stimulation of the information society in developing countries (Ford & Leinonen, 2006).

With the mobile application the Telemedicine platform opens up to the mobile technological global shift, reaching as many users as possible in low-resource settings.

5. IMPLEMENTING MOBILE SOLUTIONS

Mobile devices and particularly cell phones are a very personal item as it is primarily bought as a personal communication device. Therefore the type of cell phone a person uses depends on his/her personal financial status, technical interest and subjective need for the device. This results in a big amalgam of mobile devices that could possibly log on to the Telemedicine forum and/or access the CME modules. In order to cater to that diversity of cell phones, we focused on four specific technological and financial restraints:

- limit download size;
- keep standardization in mind;
- provide mobile multimedia as an option;
- deliver the CME functionally.

5.1 Limit download size

Whether a very simple cell phone or a Smartphone is used, it is imperative that the download size of the content is kept to a minimum to reduce the cost of accessing content. This cost can render the service as not inclusive as it might exclude certain HCWs (Bird & Stubbs, 2008).

With this in the back of our minds, we developed the CME modules to offer easy access (= small download size and as standardized as possible) to mobile phones of different generations (WAP enabled to 3G and beyond).

5.2 Standardization: following the Mobile Web Initiative

Standardization is still a big problem in mobile development; however the Mobile Web Initiative (<http://www.w3.org/Mobile/>) does ground breaking work to push forward a mobile standard that enables content to be accessible by a wide variety of mobile phones. Building on the guidelines offered by the Mobile Web Initiative and their willingness to include developing countries in the mobile knowledge revolution, we started developing CME's based on XHTML coding, with emphasis on text and images as content. This approach offered several advantages:

- The CME content became accessible by more mobile phones;
- Downloading XHTML designed content limits download size;
- The guidelines for using XHTML for mobile content delivery are freely available on the web;
- Our partner institutions in the South could use this mobile development option as well - if they wanted to - because of the open mobile possibilities;
- XHTML is a more accessible coding language and as such it can also be used by less technological savvy people. This opens possibilities for people or organizations with limited financial and/or human resources in developing countries.

In addition to the coding, images needed to be resized and adapted to mobile delivery.

5.3 Provide mobile multimedia as an option

While addressing standardization and limiting the download size of the CME modules has been achieved, the delivery of mobile multimedia content creates still some problems, due to the fact that standardization in this area is limited.

As said before, when an HCW decides to purchase a mobile device, the personal financial availability guides this choice. Some of the HCWs already have access to Smartphones, which enable them to access multimedia content. Future trends indicate that the next generations of phones will have increased multimedia capabilities and will cost less. So we wanted to address these changes, anticipating future trends. We are currently developing online courses on HIV/AIDS related issues containing audiovisual parts. However this has the limitation that they can only be accessed from Smartphones.

This audiovisual mobile content is build with a mix of screen capturing software, audio recordings, multimedia editing software and conversion software that enables conversion to a mobile device format.

The development of multimedia content implies the use of relevant visual material, which enhances the content comprehension addressing different learner skills. However at this moment the delivery of multimedia content is limited to those HCWs who have a Smartphone, who are less than 4% of the current CME users. Nevertheless, we do anticipate a growing market for these phones between HCWs, especially physicians, in developing countries.

Because the delivery of multimedia content for mobile devices only addresses a very limited amount of HCWs in developing countries, we recoded the CME modules into xhtml, enabling a broader access of that specific content, but sacrificing some of the extra learning dynamics audiovisual material can offer.

5.4 Delivery of the CME modules

The CME modules can be accessed in multiple ways. The CME modules are linked to the Telemedicine website which is available both via web and mobile devices while we could reach those HCWs with mobile interest, through an innovative mobile delivery method. This mobile delivery enables both quick access to the monthly CME and limits unnecessary mobile downloads. The delivery is easy: when a new CME is launched the HCWs with mobile access get a sms. In this sms they find the title of the CME and the relevant tinyUrl (= a freely available web-based program that enables any user to condense a long URL into a shorter URL, <http://tinyurl.com/>). This short URL guides them immediately to the appropriate CME. We decided on using a tinyurl to limit the amount of typing needed to go to the URL of the CME. Limiting typing on a mobile phone enhances the mobile user experience.

Giving to HCWs a sms with the tinyUrl to the mobile CME will enable HCWs working in remote areas to access the latest knowledge without too many extra expenses. They are enabled to go directly to the latest CME, without having to surf to the mobile Telemedicine platform first.

6. EVALUATIONS

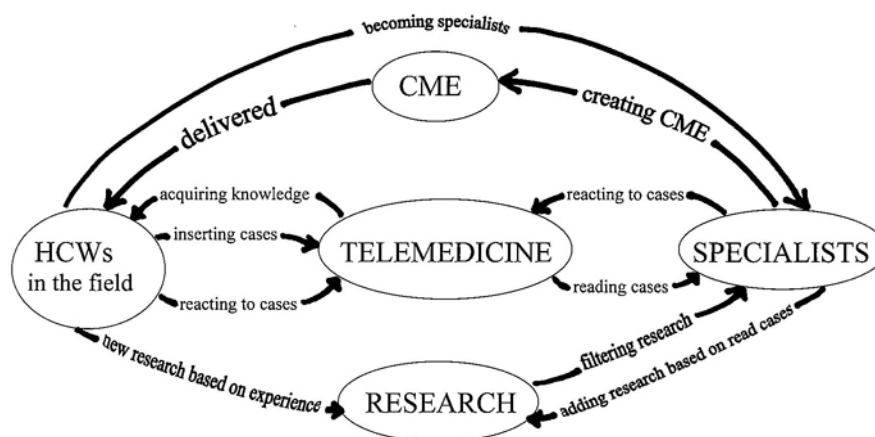
6.1 Unintended knowledge transmission

Beside the fact that HCWs with mobile access will enhance their own knowledge by accessing new content, the sharing of that knowledge with peers in the same health area guarantees that some extra knowledge transmission takes place.

6.2 CME within a bigger learning environment

Because the CME is embedded in a larger educational environment (the Telemedicine website) there is an interesting, organic exchange of knowledge going on in which all HCWs are (in)directly adding to the overall knowledge, see Figure 3. So embedding the CME in a bigger learning environment proves to be beneficial for both the CME and the learning community at large.

Figure 3: knowledge exchange



6.3 Need for standardization

The lack of - or limited - standardization between mobile brands and software gives problems in delivering mobile content. The Mobile Web Initiative enables a basic standardization for xhtml delivered content, but mobile multimedia content that can be viewed on different mobile devices, running on different operating systems remains a big problem.

7. CONCLUSIONS

When technical challenges like download size, standardized content are taken into account, delivering mobile content to developing countries is possible. The guidelines of the Mobile Web Initiative proved to be worthwhile in developing mobile CME modules that are accessible by a large diversity of mobile devices. Future trends indicate that the next generations of phones will have increased multimedia capabilities. Mobile multimedia can be delivered for developing countries, but the users are still very limited. As long as older cell phones are used, it is essential to keep the mobile content non-multimedia based to make it accessible to as many HCWs as possible. Overall the mobile CME modules answer a need in low resource areas enabling HCWs to access the latest medical information relevant for their expertise. The CME modules also contribute to the body of knowledge and experience in developing countries.

ACKNOWLEDGEMENT

This project is the result of a collaborative work of the eLearning team. The Telemedicine project is supported by the Belgian Directory General of Development Cooperation.

REFERENCES

Beute N., 2004. Challenges facing Higher Education Institutions *CITTE2004 Conference On Information Technology in Tertiary Education*, Cape Town, South Africa, (online at <http://www.citte.ac.za>. Accessed 4 November 2008).

Bird P., Stubbs M., 2008. A Bridge to Far? – Embedding Mobile Learning in UK Higher Education. *mLearn 2008 – the bridge from text to context*. Telford, United Kingdom, pp. 39-6.

Ford, M., Leinonen, T., 2006. MobilED – A mobile tools and services framework for formal and informal learning. *Proceedings mLearn 2006, the 5th World Conference on Mobile Learning*, Banff, Canada.

Salden, A., & Poortinga, R., 2006. Context-aware workflow management of mobile health applications. *Stud Health Technol Inform*, 121, pp. 47-61.

Sharples, M., Taylor, J., Vavoula, G., 2007. *A Theory of Learning for the Mobile Age*. In Andrews R. & Haythornthwaite C. (eds.) *The Sage Handbook of E-learning Research*. London: Sage, pp. 221-47.