DEVELOPING E-LEARNING IN PALLIATIVE CARE EDUCATION IN SUB-SAHARAN AFRICA:
IDEAS AND EXAMPLES FOR THE SELECTION OF APPROPRIATE MEDIA AND TECHNOLOGY

JANUARY 2012

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Princess of Wales Memorial Fund
The Work Continues
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The Diana, Princess of Wales Memorial Fund

The Diana, Princess of Wales Memorial Fund continues the Princess’ humanitarian work in the UK and overseas. By giving grants to organisations, championing charitable causes, advocacy, campaigning and awareness raising, the Fund works to secure sustainable improvements in the lives of the most disadvantaged people in the UK and around the world.

The Fund’s Palliative Care Initiative (PCI) has been working since 2000 to integrate palliative care into the care and treatment of people with HIV/AIDS, cancer and other life-limiting illnesses in sub-Saharan Africa. Ensuring there are enough people to deliver palliative care in homes, clinics and hospitals is critical. The PCI has therefore invested heavily in education and training, including using new technology, such as e-learning, to train more health professionals in palliative care.
EXECUTIVE SUMMARY

Written for The Diana, Princess of Wales Memorial Fund, for providers of palliative care worker training in sub-Saharan Africa (SSA), this report focuses on:

• The potential for e-learning in the near and medium term, due to increasing mobile technology, internet access, and decreasing hardware costs in SSA

• E-learning as a range of tools capable, when appropriately designed, of training large numbers of palliative care workers at reasonable cost

• The flexibility that these tools offer learners in terms of where and when they learn

• The flexibility that they offer providers – in enabling training material to be shared and reused between institutions

• The many styles of interaction that e-learning can support, such as collaboration within groups, repetition and personalisation of material, and testing for comprehension, including providing immediate feedback

• How e-learning can be embedded in Virtual Learning Environments to track learner progress, providing evidence of achievement.

Given the context, that is, the varying access to technology, the community in which palliative care is given and their expectations, and other practical considerations within SSA, there can be no “one-size-fits-all” approach to e-learning.

As a result, this report:

• Suggests questions that need to be considered before and during the purchase or commission of e-learning

• Presents case studies which illustrate successful use of e-learning in a variety of palliative care and medical settings both within SSA and elsewhere

• Contains a glossary of terms and applications that are commonly used in e-learning.
INTRODUCTION

This report is intended primarily for health professionals who train palliative health workers in sub-Saharan Africa (SSA). It acknowledges that: i) they are aware of the necessity to increase the number of staff trained in palliative care given the need and the increased demand and ii) they take into account the context in which this training is occurring. However, it assumes that they are not necessarily technically literate and need support to consider the potential of e-learning in delivering training across SSA. The content may also be of interest to SSA university staff who already have responsibility for setting up e-learning courses, although not necessarily in palliative care training, or even general health training.

The report begins by setting out the context for introducing palliative care e-learning systems. It does this by briefly defining e-learning and its potential within SSA, especially with respect to the increased numbers that e-learning can reach compared to more traditional teaching approaches. It goes on to describe where the information was gathered and how it was analysed.

The next major section looks at e-learning more closely; considering the various techniques it employs and related issues, for example, how it can be structured for group and individual activities, the role of mentors, and hardware issues. These are then illustrated within five detailed case studies which focus on various key features that e-learning can offer. These case studies offer high and low technology alternatives for achieving similar results.

It concludes with considerations for using e-learning, for example, contrasting the ongoing maintenance costs when purchasing a training system with ensuring up-to-date content in a bespoke system.

This report should raise awareness of the potential of e-learning to support the required increase in palliative care training, as it describes the various types of technology that could be used to achieve this aim.
INTRODUCTION TO E-LEARNING

E-learning is a broad term referring to education using technology. The technology is predominantly computer based, although it can include mobile phone technologies. Thus it includes web-based material as well as CDs/DVDs and programs that can be used without internet access.

The media offered can be text, audio, image, animation, video or a combination of all these. It can also include activities for individual response, such as multiple choice, drag and drop, participating in a simulation of an event and working in groups through forums and web conferencing.

E-learning encompasses computer-based or computer-assisted instruction, online or web-based learning, and distributed learning, that is, when the content, instructors and students are in different locations and learning can occur independent of time or place.

More recently e-learning has become the medium for distance learning. Distance learning refers to teaching where the student is not physically present. Although not a new phenomenon, as correspondence courses have been around for almost three hundred years, technology has added a new perspective to this form of education.

In the UK for example, the Marie Curie nurses are offered a range of continuing professional development distance learning courses in palliative care taken online with reading, case studies and moderated discussion forums.

However, for formally examined courses, distance learning tends to be one part of a blended learning model, that is, the teaching programme incorporates face to face sessions and work-based learning alongside distance learning in order to achieve optimum results. For example, the Diploma/MPhil in Palliative Medicine at the University of Cape Town requires a five day residential every six months in addition to the electronic submission of regular case based assignments and communication using a virtual learning environment.

E-learning encompasses individual students accessing material by themselves and working alone or as part of a group learning activity. It can be synchronous, that is, where conversations progress at a normal rate, for example, in a chat room, instant messaging or teleconferencing. Or it can be asynchronous, where the transmission and reception of information are not simultaneous and a conversation can be spread over days or even weeks. Examples of this are email, weblogs (blogs), discussion boards and wikis. Wikis allow students to access material at their convenience, while discussion boards require consensus for time of meeting.

From a technical perspective, e-learning can make administration easier. For example, virtual learning environments or learning management systems automatically log learners’ activity, including completion of modules. They allow students and staff to keep all submitted work or relevant reading in one area.

Assessments and quizzes can be automatically marked – this is not just more efficient but can also be fairer than marking by hand. Where appropriate, immediate feedback on performance can be given and marks can be added to learners’ records. Feedback by students on a course can be collected and summarised automatically.
Developing e-learning in palliative care education in sub-Saharan Africa

Educationally, e-learning can provide material tailored to the students’ current understanding, allowing them to make the most efficient use of their time. They can spend less time on training exercises where they are stronger, leaving them time to become confident in areas where they are weaker. It can also allow them to ‘experience’ case materials or simulated situations which they would not otherwise be able to access because such conditions are not available in their clinic at the time. It opens them to situations where ‘real’ patients could be harmed mentally or physically or to which it would normally be too dangerous for student exposure.

The interactivity which e-learning can provide allows students to cross question, apply tests or make diagnoses. The Virtual Patients’ project in Malawi allows staff to create virtual patients for their students and list preferred treatment courses for them. At the other end of the spectrum, iCases Influenza Outbreak allows trainee health workers to interact with experimental data in a realistic context in which students are given limited time and money in which to decide what tests are needed to resolve a complex situation. What would normally take six hours contrasts with the 20-minute interactions with virtual patients.

**e-learning in SSA**

In SSA, interest and expertise in e-learning has been expanding. In 2006 the first e-Learning Africa conference had just over 830 participants – over 630 of them from Africa itself. By 2011 this had risen to over 1,700 with over 1,410 participants coming from Africa. Although a wide focus, health training is identified as benefiting from e-learning by those attending these events. This is illustrated by the 2012 call for papers in the e-Learning Africa conference. Within the e-Learning for sustainable communities theme there is a specific request for papers addressing: “How does e-Learning support professional development for sustainable health care and delivery systems?” The mHealthEd conference is even more relevant, focusing specifically on mobile technologies for supporting the delivery of health care and training in the developing world.

So why is e-learning gaining popularity? One reason is the reduction in the cost of hardware.

Mobile phones are becoming ubiquitous due to the reduced cost. According to a recent Gallup poll of 17 SSA countries, 57% of the adult population (over 151 million people) have mobile phones, although ownership in urban areas is significantly greater than in rural areas (69% and 53% respectively).

Low end phones costing a few dollars, for example, have successfully been used in the MoTeCH (Mobile Technology for Community Health) project in Ghana to provide weekly, relevant, actionable and fun pregnancy care information through the short message service (SMS) or voice messages directly to mothers in appropriate dialect and language. This has led to the mothers being more confident about pregnancy and more aware of how to care for themselves and their unborn child.

Furthermore, mobile phones are allowing access to the internet and hence online material. This material is easier to update and share than printed material. Internet subscribers accessing the internet using the mobile phone network is high, for example, by 2009, 98% of Kenya’s 1.7 million phone owners had internet access.

Improved access to the internet is also possible through more traditional computers. Although initial purchase of hardware is expensive, improved internet coverage and reduced costs through African undersea fibre optic cables mean that internet based courses can be accessed in more geographic locations more affordably. Until recently this high cost has been a major drawback in the development of e-learning. Problems with the use of computers, let alone the internet, are further compounded by varying degrees of access to electricity in remote African regions.

Another reason for the interest in e-learning is the potential numbers that can be trained. A similar amount of effort is needed to prepare course content for a traditional face-to-face teaching environment as for an online course.
In the latter there may be additional expenditure in converting the material to computer or mobile format.

However, attendees to a traditional course are limited by the physical space available for students, the time the course is held, and by difficulties in reaching its location. These do not apply to e-learning systems, which can host far more students at times and in places convenient to learners. This is illustrated by an AMREF course, where nurses in Kenya access the registered nurse training online, allowing more to be trained in more parts of the country while fitting round their existing commitments and at a lower cost than residential training.

Although not as important in staff retention as pay, tackling training and career development opportunities are key factors in retaining health care workers.

In Ghana for example, more than 475 of the 500 community auxiliary nurses trained through the TulaSulad programme, which conducts distance training through the internet supported by mobile phone audio-conferencing when in the field, have continued to work in their communities.
METHODOLOGY

Content included
This report has been compiled and reviewed by experts in both palliative health care and educational technology. To support the themes of i) e-learning in SSA, ii) e-learning for healthcare, and iii) distance learning strategies, the report pulls together an extensive literature review of academic resources (such as the MetaLib database or Google Scholar), websites from policy organisations (e.g. LIDC) and existing schemes run by NGOs (e.g. text2change, TulaSalud). However, it excludes all reports and projects that have not been documented in English. It is supplemented by responses from a questionnaire on current practice sent to those who train palliative health care workers in SSA.

The report has been reviewed by APCA and The Diana, Princess of Wales Memorial Fund.

The case studies and the technology discussed were selected as being those in which key features are transferable to other projects within the region or illustrate the potential of e-learning, such as:

• Tools to create virtual patient (VP) structures that allow health educators to design a VP that fits their curriculum requirements, rather than having to wait for a patient that demonstrates the teaching goal – as in Malawi Virtual Patients

• Automatically updating student records when training modules are complete – as in e-ELCA

• Utilizing mobile phone coverage to allow training in rural areas – as in SMSFrontiers.

General limitations
Providing evidence of the impact of e-learning programmes is problematic. Many have only recently been initiated, and mostly as pilots, implying extra resources and commitment from participants. Furthermore, as identified by the Distance Learning for Health workshop in 2010\textsuperscript{16} and the 2009 review of distance learning in Tanzania\textsuperscript{17}, existing programmes have often not considered how they will be assessed for effectiveness. This includes not only the standard of knowledge retained but the students’ perceptions of the course. Thus, although this report describes existing schemes and their potential as well as what constitutes e-learning, it emphasises that in the future project evaluation is a key consideration and, if e-learning is to spread, evidence of its effectiveness needs to be collated and disseminated.

A second point to note is that this report cannot provide exact costings, for example both in terms of payment for hardware, software, internet access etc, and in terms of staff hours to develop software, manage courses and update content. These figures will vary depending, for example, on the provider, the country and the experience of developers. Thus this report provides only indicative costings, stating if an option is a high, medium or low cost.
BRIEF OUTLINE OF RANGE OF E-LEARNING TOOLS

As mentioned in ‘Context: Introduction to e-learning’, e-learning encompasses the use of almost any information or communication technology in any number of different ways.

In this section some of the variations are considered. It begins by discussing the various hardware and infrastructures that can be used. It then looks at content delivery, progressing to how an individual can interact with data when working alone, asynchronously, and finally, how they can interact with others on the course. E-learning systems often have a combination of all three: content delivery; individual interaction with material and interactions with others.

E-learning hardware, software and infrastructure

As the name implies, e-learning requires technology. This covers: hardware (the machines), software (the programmes) and the infrastructure to support these (such as electricity, internet access or mobile phone coverage). All three require keyboards as well.

The most portable technology is the mobile phone, which is evolving from a simple communication tool into a service delivery platform. In 2010 there were fewer than three landlines/wired telephones per 100 people in SSA, yet over 30 mobile phones per 100 people (as at that time 60% of the population of SSA had mobile phone coverage).

By 2012 most villages in Africa will have coverage, with only a handful of countries (Guinea Bissau, Ethiopia, Mali, and Somalia) remaining relatively unconnected and, by 2013, over 95% of the region will have 2G coverage. 2G is short for second-generation wireless telephone technology, which means that they were built mainly for voice services and slow data transmission. So SMS messages can be sent and the internet can be used but the latter is not fast.

The latest mobile phones (‘smartphones’) require 3G (third generation) coverage which allows for a higher data transmission rate and thus can support online applications; such coverage is already available in many cities within SSA. Different handsets are required for the various generations of phones (see page 50 in the glossary).

Virtual learning environments (VLEs) and content management systems (CMS)

Although VLEs and CMS can be considered as part of the infrastructure, it is important to remember that they provide the course framework which allows access to the e-learning material and functionality.

This is not the same as the course content, i.e., the material to be covered. A VLE or CMS may track the learners’ activity including, for example, what they have accessed, when they have accessed it, assessment results. This allows learners and tutors to report on and monitor activity. The VLE or CMS can offer pathways through material, and, if necessary, only allow modules to be accessed when the student has fulfilled specified prerequisites.

By bringing many different technologies together in one system, the user experience is streamlined with e.g. a single username and password for everything.
Content delivery within e-learning

Although the electronic delivery of content alone is not e-learning, for example, the creation of a webpage is not an e-learning course, the delivery of content is integral to e-learning.

This can be achieved through:

- Written material, that is, text information accessed through a programme, an electronic book (e-book) or online as a webpage or wiki. It can include links to other pages and images and search functions. For example, the PalliApp application for iPhones offers the palliative adult care guidelines (effectively a standard book) adapted so that it has a search function.

In some cases this material is designed to be printed and may contain self-assessment questions. This is illustrated by the Health Education and Training (HEAT) project in Ethiopia where the material can be printed or viewed online, and questions can be answered by the learner before they press a button to reveal the text answer.

- Non-interactive audio and video material such as podcasts. Podcasts are multimedia digital files made available on the internet for downloading to a portable media player, computer, etc. For example, the Palliative Care Victoria Inc (PCV) group, who represent palliative care providers, consumers and their families, and those with an interest in palliative care in Victoria Australia have recorded experts discussing various issues from how to break bad news to how to use morphine. The discussions are freely available online.

- Video and animations viewed alongside text and audio. These could be case studies in a video format in a palliative care setting, as in the end-of-life material from the University of Stanford.

Interacting with data within an e-learning environment by an individual

One advantage of e-learning is the ability to interact with material after reading, thus reinforcing the learning. The most common interactions are based around interactive diagrams, which reveal further information and questions (multiple choice questions – best of five, drag and drop, etc). Responses can be recorded and feedback on the answers chosen can be given immediately or at the end.

Moving beyond simple questions, the VP project in Malawi chains together multiple choice questions to create something altogether more engaging by simulating the dilemmas and consequences of real-world decision making. A game-like element can be introduced, as in the iCase influenza Outbreak, by giving students limited resources (time and money) with which to work.

With increased resources, simulations and animations can be used to allow learners to explore difficult to understand processes and concepts and the same games technology used in the leisure games industry can be used to create exceptionally realistic scenarios. This is illustrated by Blitz Games who created Triage Trainer and Patient Rescue.

Interactions with others within an e-learning environment

Facilitated discussions

Whether e-learning interactions are synchronous or asynchronous (see Context: Introduction to e-learning), a facilitator or moderator is commonly required. This is another student or member of staff responsible for policing the conversations to ensure they are appropriate, or seeding conversations by asking appropriate questions, or suggesting an area for consideration. They are also responsible for ensuring participation. This requires a different set of
skills to facilitating a face-to-face discussion as there are no facial or verbal cues. In such cases it is important to set out ground rules, for example: stating how frequently the tutor checks for emails or questions; ensuring all are familiar and happy with the method for interacting; and the number of responses required from each participant.

As in more traditional teaching approaches, working with others can be beneficial. In the case of Marie Curie nurses doing the online communication course, one of the most valued aspects is the interaction with nurses that they would not normally meet due to distance. The shared perspectives enrich the experience for all participants. For this to work, effective facilitation of the discussion is required.

Discussions can take place in any number of fora on the internet. They can be through blogs, where students comment on the experiences recorded by one of their group online, or through video or audio conferencing where the students share ideas or listen to presentations as a group. It could also be through forums where questions can be posted and responded to in a structured format.

Web-based peer support
Web-based peer support can be found in online communities formed around a common interest. An online community site can contain content, that is, articles and information relevant to the group’s shared interest. It also allows communication between members, asynchronously through forums, mailing lists, news groups and emails and synchronously through chat and instant messaging.

In these groups, peer support is provided by members “virtually” sharing experiences and information, asking and responding to questions, and providing emotional support where necessary. Community members need not be geographically close due to their use of technology for communication.

In the health sector for example, these communities may not only ask questions, respond, and develop relationships, but they can influence and disseminate research. This is achieved through raising real problems that need research, possibly collaborating in these projects, avoiding duplication, and allowing results to be disseminated effectively.

Online communities often use social networking technology. A social network usually requires members to register in order to contribute, and members are often asked to give a profile that describes relevant interests or expertise. These profiles may also track the relationships and information viewed by that person. Facebook is a well known global social network, but a better example of an online community which provides support might be Mumsnet in the UK, a community around parenting that supports around 1.5million users per month.

The following short case studies describe online communities developed to support healthcare workers (See overleaf).
CASE STUDY 1:

Vula discussion forum

Vula is the University of Cape Town’s (UCT) online collaboration and learning environment. It enables communities with a common interest to:

• Network, collaborate, and have learning opportunities
• Share a space for innovation, discovery and exploration - either locally or internationally
• Access material
• Collect and store data and provide a space for reflection on this material.

At a more practical level it can support administration, assessment, communication and resource-sharing features.

Vula is used to provide peer based support for the Diploma in Palliative Care offered by the University of Cape Town. Students were given a topic every week to discuss. However, students report that they benefit most when the topic focused on an individual’s experience rather than a general discussion. They also felt that they would benefit more if participation was compulsory, with input impacting the final mark. This illustrates that in generating peer support, the community format, the type of questions raised, and the site structure are as important as a shared interest.

For further information on either case study see:

Vula: https://vula.uct.ac.za/portal/site/gateway/page/gateway-200

MedicineAfrica: The literature section on the MedicineAfrica site: http://www.medicineafrica.com/node/25

An interview with Dr Alexander Finlayson, one of the three founders of MedicineAfrica – http://doctorpreneurs.com/interviews/alexander-finlayson.

CASE STUDY 2:

MedicineAfrica

MedicineAfrica describes itself as “an online health facility which enables doctors and other healthcare professionals to receive clinical support and training live from faculty and clinical supervision around the world interacting in small groups”. It is web-based, but designed to use a low bandwidth, which means that it can be accessed through a mobile connection rather than being only available in locations with broadband. Health workers in the developed world can log on and respond to queries or deliver clinical teaching to the ‘bed-side’ in Africa in order to remotely support health-care professionals in low-income countries in real time. Note that it is not one way: for example, doctors in Somaliland have also taught doctors in London about real-world tropical medicine cases.

MedicineAfrica was initially developed by the King’s-THET-Somaliland Partnership (KTSP) who identified the need for distance clinical tutoring and mentoring to supplement and bridge the gaps between visits by KTSP staff. As part of this project, doctors in the UK support weekly case-based teaching to intern doctors and medical students in various disciplines such as paediatrics, obstetrics, surgery and psychiatry.

Since then further partnerships have been set up. For example, a pilot program using the MedicineAfrica interface and community structure is running with doctors at Oxford University Hospitals supporting medical students and staff in Palestine in an online case-based teaching programme. Current topics include presentations in medicine and surgery, but will be expanded to include paediatrics, psychiatry, evidence-based medicine and other clinical specialties. The MedicineAfrica interface and community structure is also being expanded to Sierra Leone (paediatric training), Ghana (cancer care), and Zimbabwe.

It should be noted that the community members are not reimbursed for their participation; any finance accruing supports the online architecture.
BENEFITS AND CHALLENGES OF E-LEARNING FOR HEALTH WORKER TRAINING

In the context section, we introduced some of the benefits of e-learning, the key ones being:

- The increased access to technology which can be internet enabled, thus making possible the easy distribution and updating of course material
- The bigger numbers of people that can be trained
- Increased staff retention.

This section expands upon the potential benefits and challenges of e-learning for providers and students.

Advantages for providers

**Administrative**

- Economies of scale: for a given resource (e.g. the instructor), the numbers that can be taught and complete the course can be greater than in face-to-face training
- Allows shared access to material between institutions, encouraging collaboration and further increasing economies of scale
- By making more efficient use of staff teaching resource, time can be freed for their work as health professionals in practice. The flexibility offered by e-learning allows them to fit in their teaching time around this
- VLEs may reduce the institutional infrastructure required. In more general medical practice the ability to log patient information directly rather than send it in to be transferred has led to improved patient care, for example, the FrontierSMS logging of pregnancy status or the Malaria surveillance project. Both of these report data in real time and allow tracking of patients and thus advance planning. E-learning can deliver the same benefits in student teaching and learning
- Provides suitable examples for that point in the course without having to provide students with access to patients who illustrate the situation being studied. Examples could be factual around calculating dosage for pain medication, or they may allow students to experience situations such as having to break bad news.

**Reach**

- Geographical reach - a course can be offered to students over a wider geographical area, as with the AMREF training for nurses. This can reduce costs for travel and subsistence
- Because it is comparatively simple to change electronic resources, courses can be tailored for the country or region, rather than using generic courses or adaptations of courses for countries in the West. For example, they can contain case studies or examples that are relevant to situations which students will be likely to face.

**Outcomes**

- There is a similar or better level of completion of good distance learning courses compared with face-to-face teaching
- The 'brain drain' that occurs when students go abroad for training can be reduced. The School of Public Health at the University of the Western Cape found students are more likely to stay working in the health sector for the 3-4 years it takes to complete the distance learning course. Furthermore, those trained are more likely to continue working in their communities once the training is finished and their improvements in capacity and practice are more likely to be sustained.
Advantages for students

**Logistics**
- The community health worker/nurse/doctor can continue to work in their local environment, and maintain an income, while reducing travel, accommodation, and food costs. This is a key consideration. For example, students in South Africa are likely to be mature students with responsibilities for family and career, and have limited funds to pay for their own study and travel given that bursaries for study are not readily available.
- As in the AMREF scheme, there are more course places for study.
- Students have flexibility as to when to study, the pace at which they study (if an asynchronous course) and the flexibility to spend more time on those parts of the course which they find more challenging.

**Learning experience**
- Depending on the course, the students can access national experts who have created a comprehensive resource covering the entire curriculum.
- They may have flexibility about the media they can access (for example, written, audio, visual, practical tasks such as contributing to a discussion) and in which order to fulfil a learning objective.
- Computer marking of assessments can be fairer than people marking as it removes the element of marker’s discretion.
- Searching for vital information online is much easier than it is to leaf through hundreds of pages of notes or books even with multiple indexes – assuming the site has suitable tagging or search options.
- Standardises course content and delivery: lectures will vary less even than one given by the same lecturer in different years, or if the same lecture is given by different people.

Challenges for providers

However, there are challenges to introducing e-learning which need to be considered.

- The Sub-Saharan Africa Medical School project (SSAMs) highlighted start up and maintenance costs, along with difficulties in accessing the internet.
- The creation and maintenance of contextualised, up-to-date, and relevant distance learning resources. For the HEAT project, Ethiopian trainers spent a year working on content in conjunction with experts from the OU.
- Staff need training to mentor students effectively in virtual settings, to moderate their discussions and be able to motivate them and ensure they know how to apply the curriculum to their practice.
- There need to be effective systems in place, for distributing materials, supporting students, and monitoring and encouraging their progress.

Challenges for students

- Students need to be able to easily access the materials.
- Students may need training in using some systems.
- Students may need support so that they do not feel isolated, especially in courses where they work predominantly alone.
CASE STUDIES

The case studies in this section have been selected to illustrate the potential of e-learning. They focus on the key advantages and disadvantages of four distinct systems that could be used or adapted.

Where applicable the costs have been separated into:

- Development and maintenance
  - Production costs (time)
  - Production costs (hardware and software)
  - Maintenance costs (content)
- Infrastructure
  - Hardware and software costs for provider
  - Hardware and software costs for student
  - Course cost to run.

These have been divided into low, medium and high costs (colour coded light purple, mid purple and dark purple respectively). This is to allow an easy comparison of implementation techniques.
CASE STUDY 3:

AMREF - KECHN (Kenya Enrolled Community Health Nurse) Certificate to KRCHN (Kenya Registered Community Health Nurse) Diploma eLearning Upgrading Programme

Overview
The e-learning programme starts with a one-week induction period, including information and communication technology training.

Each of the modules of study involves six months of distance-based self-study to complete, including elements of clinical practice at the workplace. Each module is accompanied by two weeks of face-to-face residential tutorials, plus two telephone tutorials.

Assessment on each module includes: four emailed assignments; mid-module examinations; end of module examinations. Both mid and end of module exams have computer-based and written components.

In addition to completion of the modules of study, participants are expected to complete 42 weeks of clinical practice during the modules.

Advantages:
- The integration of clinical practice within the course
- Flexibility for the student as to when to access course content
- Coursework can be completed in one-and-a-half years, instead of the three years for regular classes
- Illustrates the economy of scale: as 5,400 are currently enrolled, a number which could not be taught in the traditional manner.

Disadvantages:
- The initial investment in the development of material
- Ensuring access despite low internet connectivity.

Developers
The course is a public-private partnership with the e-learning upgrade having began in 2005 between:
- Nursing Council of Kenya plus associated teaching hospitals (Kenya Medical Training College and its constituent colleges)
- Accenture, the global management consulting, technology services and outsourcing company
- African Medical and Research Foundation (AMREF)
- Kenya Ministry of Health.

Intended audience
There are 5,400 nurses currently enrolled on both e-Learning and print-based learning modes in Kenya. The aim is to upgrade the competencies of 22,000 enrolled nurses from certificate to diploma level within five years.

Course length
Students can complete the coursework in one-and-a-half years, instead of the three years for regular classes.

Course qualification
At course completion the nurses, who initially are qualified to certificate level, will receive the registered nurses’ diploma. This means they are qualified to treat major diseases, such as HIV, TB and malaria.

Indicative costs
Development and maintenance

Production costs (time, hardware and software)
In 2005 Accenture announced a US$2.9 million donation to AMREF to implement an e-learning programme to increase the number of qualified nurses in Kenya.

Maintenance costs (content)
One reason an e-learning course was developed was the ease of revision of electronic material. The cost is the same for the face-to-face course as it involves amending only the data rather than the infrastructure.

Infrastructure costs

Hardware and software costs for provider
The programme has 105 regional training centres (where students access the online components) in eight provinces, including rural, remote and marginalized districts (e.g. Garissa and Dadaab Refugee Camps in the North Eastern Province of Kenya). The training centres hold a total of 463 computers and over 230 nurse mentors. Each training centre is open 24 hours a day.
CASE STUDY 3: (CONT.)

Hardware and software costs for student
These are minimal as the students have access to computers through the regional training centres.

Course cost to run
Students predominantly work alone. However, there are over 230 nurse mentors and the 105 computer-equipped training centres which need to be funded, as well as the face-to-face residential sessions, the exam marking and the telephone tutorials.

Alternatives and comparative costs

Low technology
DVD-based content delivered by the desktop-based Sharable Content Object Reference Model (SCORM) 33 player as at http://www.reload.ac.uk/new/scormplayer.html

Advantages:
• No internet access required
• No large Learning Management System (LMS) required to track student’s progress, module completion, etc.

Disadvantages:
• Uncertainty about the availability of all functions
• No tracking of completion of course/module; although certificate could be printed out at the end
• Cost of creating and distributing DVDs
• Difficult to rectify mistakes/ensure it is up to date
• Support for SCORM player is online and therefore it may not be accessible.

High technology
Replace existing LMS with Moodle

Advantages:
• No licence fee.

Disadvantages:
• Requires more software maintenance BUT this is a labour cost so may be cheaper in SSA
• Requires hosting space.

Table 1: Analysis of AMREF costs
The table below summarises the indicative costs. The first column refers to using the AMREF software as it stands, hence the low cost of development, hardware and software, and cost of running the course. The second column looks at the costs to redevelop material to be country appropriate or to add new modules where necessary. The third recreates the system from scratch using the existing e-learning format and content, while the remaining two columns look at the cost of the two proposed alternatives.

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For further information see:
http://training.amref.org/index.php?option=com_content&view=article&id=93&Itemid=89
CASE STUDY 4:

e-ELCA

Overview
e-ELCA is an e-learning course designed to enhance the training and education of health and social care staff involved in delivering end-of-life care in the UK. It is designed so that staff and volunteers can deliver well-informed high quality care confidently and competently.

The system is constructed for individual use, although it has been promoted as a starting point for face-to-face discussion in seminars.

There are 156 online sessions arranged across 8 modules: advance care planning, assessment, communication skills, symptom management, social care, bereavement, spirituality and integrated learning. The latter helps students to consolidate and apply understanding in different situations.

Each session should take around 20 minutes to complete and may incorporate a variety of features, for example, self-assessment tools, audio/video clips, case studies, as well as modes of interaction, such as drag and drop, multiple choice and open-ended questions.

The whole programme is open to all health and social care practitioners who are registered to use it, but there is guidance (learning pathways) for different staff groups.

Advantages
- High level of interactivity
- Flexibility for the student as to when to access course content
- Integration with employee records for tracking progress
- Written and peer reviewed by practitioners in palliative and end-of-life care.

Disadvantages
- Licensing costs
- Development and maintenance time.

Developers
E-Learning for Healthcare (e-LfH) in partnership with the Association for Palliative Medicine of Great Britain and Ireland to support the implementation of the English Department of Health’s national End of Life Care Strategy (July 2008).

Intended audience
UK health and social care staff involved in delivering end-of-life care to people, that is, doctors (in hospitals and in general practice), nurses and other health care staff, social care workers, and hospice staff. There are also sessions available for administrative and clerical staff and volunteers.

It is available to purchase by other countries. Some of the content is specific to UK policies, but most of the learning material is generic (over 90% is transferable) and applicable to other countries.

Course length
Variable depending on the time the student has, although it is not necessary to complete all sessions.

Course qualification
This is designed to be a learning resource with certificates printable at the end of each session, rather than an accredited course. In the UK, health and social care staff can access this programme through the National Learning Management System (NLMS) or e-Learning for Healthcare System – both records and tracks automatically the activity (including completions) of learning for that individual.

Indicative costs
In this section the cost of replicating the software within the relevant context is considered. However, although NHS staff and those involved in palliative care in the UK can freely access the software, outside the NHS in the UK and outside the UK the list price per individual for a licence per year is £199 (excluding VAT) with a reduction for multiple licences.

There were plans to find sponsorship for use of e-ELCA in the developing world which would allow price negotiation.
CASE STUDY 4: (CONT.)

Development and maintenance

Production costs (time)
The production in terms of staff time for an e-ELCA equivalent is high. There were 150 authors who contributed content and twelve instructional designers to take the material and adapt it to fit appropriate interactions, e.g. drag and drop, multiple choice. The programme took about 18 months to develop; each of the 156 sessions were developed over a period of 3-4 months.

Production costs (hardware and software)
e-ELCA content is developed using the eXact packager software, which for the relevant number of developer licences is a high cost, although in terms of UK procurement was value for money. The e-LfH team develops its own templates for use within this software.

Maintenance costs (content)
The content is regularly reviewed and updated when necessary, for example, to take into account different medications, guidelines. There is an annual budget of £15k for content update, which is considered high when compared to the budget normally allocated for maintenance.

Infrastructure costs

Hardware and software costs for provider
All e-ELCA hardware is maintained and updated through a service contract with a third party provider. Software is purchased or licensed as required through third party providers. If replicated this would have to be arranged or server space provided, including the possibly high separate payment of VLE and software licence fees.

Hardware and software costs for student
The student requires ongoing high rate internet access to complete modules though no other
Developing e-learning in palliative care education in sub-Saharan Africa

software than an internet browser (with standard plugins like Flash) is required. In the UK this is a low cost option, in SSA it is variable depending on location. A printer is optional, being required only if the student wishes to print out the curriculum workbook.

Course cost to run
As students work individually and do not interact with tutors or peers once they have logged in, there is no cost to the provider. However, students and palliative care teachers are encouraged to use the programme as part of blended learning, such as working through a session together. This would incur costs.

Alternatives and comparative costs
None of the following alternatives avoids the need for face to face sessions and clinical work.

Low technology
DVD-based content delivered by desktop-based SCORM player such as http://www.reload.ac.uk/new/scomplayer.html.

Advantages:
• No internet access required
• No large LMS required.

Disadvantages:
• It is unlikely all functionality could be achieved
• No tracking of completion; although could possibly print out certificate at the end
• Cost of creating and distributing DVDs
• Difficult to rectify mistakes/ensure up to date
• Support for SCORM player is online and therefore may not be accessible.

High technology
Replace existing LMS with Moodle

Advantages:
• No licence fee.

Disadvantages:
• Requires more software maintenance BUT this is a labour cost so may be cheaper in SSA
• Requires hosting space.

For further information see:

Twelve sessions containing multiple modules are freely available to volunteers and clerical and administrative staff in the UK and worldwide on an open access website: www.endoflifecareforall.org.uk. Although very basic, these sessions may be particularly useful as a starting point for those less confident of their computer skills.

Table 2: Analysis of e-ELCA costs
The following table summarises the indicative costs. The first column refers to buying e-ELCA as it stands, hence the low cost of development, hardware and software, and cost of running the course.

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<td>Cost to student</td>
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CASE STUDY 5:

Virtual Patients – (Malawi)

Overview
The medical student is given a brief summary of a virtual patient (VP). They are then given options about what to do next, for example, a choice of questions to ask or tests to run. Once an option has been chosen feedback is given on the appropriateness of the choice, and in some cases links to further reading around that option (see Figure 2 below).

At any point students can review their pathway to show the decisions made so far. This pathway can also be compared at a later date with that of an expert.

The VPs follow a simple branching structure that Malawi medical trainers have learnt how to create. Thus they offer elements of a realistic context as the patient and situation are described in detail in text and pictures.

Furthermore, each VP can present a variety of data and resource types. However, if a student selects an incorrect option, for example, if they choose to send a patient home immediately, there is no consequence: the patient is not followed home and their re-admission presented. Instead the system states why their answer is wrong, and then allows the user to select another answer. This lack of reality separates these VPs from a game or simulation where each action has consequences until the game or simulation ends. Thus although they can be realistic, there are constraints about how much reality they can represent.

The staff were trained to create VPs over three two-day workshops. The first workshop focused on the creation of storyboards; the second on methods of transferring storyboards to digital format. To build the VP navigation maps they used a Visual Understanding Environment (VUE) and Labyrinth, a bespoke VP authoring tool developed in Edinburgh. The third workshop focused on transferring the skills required for embedding online resources such as VPs into healthcare curricula.

From the three initial workshops held, twenty VPs were created. There are currently over 400 patients, but these can only be accessed from within the network of the University of Malawi College of Medicine.

Advantages
• The ability for staff to create relevant VPs in a timely manner
• The use of storytelling as a teaching tool which is integral to traditional teaching in Malawi culture.

Disadvantages
• Staff training in how to use the software to create the VPs is relatively time consuming.

Developers
The programme was developed by the College of Medicine and Veterinary Medicine in the University of Dundee and by the major academic institutions in Malawi responsible for the undergraduate and postgraduate education of medical and healthcare professional educators (The University of Malawi College of Medicine, Kamuzu College of Nursing, and the Malawi College of Health Sciences (Clinical Officer training)).
CASE STUDY 5: (CONT.)

**Intended audience**
The learners are clinical students from the three institutions involved.

**Session length**
This is dependent on the VP; however the average VP has approximately six stages to complete although some of these take longer due to links to relevant reading.

**Course qualification**
There are no qualifications directly associated with the use of VPs in this course, however, that is part of the training of all first and second year clinical students at the institutions involved.

**Indicative costs**
In this section the cost of using existing VPs in courses is compared to that of creating new VPs or creating similar without using VUE and Labyrinth.

**Development and maintenance**

**Production costs (time)**
The course provider needs training in VUE and Labyrinth in order to create a virtual patient. However, this can be done locally using staff trained in the initial workshops as a VP is relatively straightforward to produce. Twenty were designed in the first workshop.

**Production costs (hardware and software)**
The hardware required to build a VP is standard and was already available in the Malawi institutions. The VUE and Labyrinth software was made freely available to the medical and healthcare professional educators.

**Maintenance costs (content)**
The maintenance costs are low once the principles of VP design and the software has been mastered, as new VPs can easily be created by trained staff to complement their course and take into account the clinical area to be trained.

**Infrastructure costs**

**Hardware and software costs for provider**
The VPs need to be stored for online access or converted to Flash so that they can be run independently of the internet on standalone machines. Thus there are minimal costs, although some server space is required.

**Hardware and software costs for student**
The student requires access to a computer. It is not necessary to have internet access as the VP can be created to run as a standalone programme, nor are the VPs printed or responses recorded.

**Course cost to run**
As students work individually and do not interact with tutors or peers once they have logged in, there is no cost to the provider.

**Alternatives and comparative costs**

**Low technology**
VPs can be created as a purely text-based branching exercise. This can be as simple as creating a non linear Power Point, that is, where buttons are inserted which when clicked take you to that slide (for a demonstration see http://www.guidesandtutorials.net/tuts/281/pptinterface/index.htm).

**Advantages:**
- No internet access required
- No learning of bespoke software.

**Disadvantages:**
- Time to map out all the alternative branches.

**High technology**
Replace existing VPs with a game engine model which allows a greater degree of branching allowing actions to have consequences. For example, see: Patient Rescue (http://www.trusim.com/?page=CaseStudy).

This is a proof of concept for a game designed to support health professionals to recognise the signs of patient deterioration. Once the learner has assessed the state of the patient, they have to make an appropriate intervention which dictates the next state of the patient. The game is over when
Developing e-learning in palliative care education in sub-Saharan Africa

the patient is stabilised or dead. A feedback screen shows the player where they made the correct decisions, what they missed and which decisions were incorrect and potentially dangerous.

**Advantages:**
- Mimics reality, allowing the learner to experience the consequence of actions
- Detailed feedback around decisions.

**Disadvantages:**
- Requires more development time BUT this is a labour cost so may be cheaper in SSA
- Requires a licence for the game engine.

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</table>

Table 3: Analysis of VP costs
The following table summarises the indicative costs. The first column refers to using the VPs already created, hence the low cost of development, hardware and software, and cost of running the course.

For further information see:
The 2009 paper in Medical Teacher: "Online virtual patients – A driver for change in medical and healthcare professional education in developing countries?” by D Dewhurst, E Borgstein, ME Grant and M Begg, Vol. 31, pp. 721-724.

http://ejournals.ebsco.com/Direct.asp?AccessToken=95MsJQ8XZDR95ZRUkPl44D1j4X814X4&Show=Object&msid=-427793391


http://www.sciencedirect.com/science/article/pii/S1479666X10002969

To try out a virtual patient, visit:
http://malawi.mvm.ed.ac.uk/labyrinth/malawi/mnode_client.php?id=24911&mode=remote
FrontierSMS applications

Overview
FrontlineSMS is a free, open-source software platform that enables large-scale, organized SMS communication. The users need only pay for the standard SMS message charges.

If a computer running FrontlineSMS is connected to a GSM (Global System for Mobile communications) modem or a mobile phone, it acts as a text-messaging hub collating information from these multiple phones. The software manages contacts, allows for mass-messaging, auto-forwarding and auto-reply, and enables special actions based on keywords.

This capability allows systems to track patients, such as through the TulaSalud project in which local health workers track pregnancies and, through the hub, are able to download patient information and receive reminders about individuals. This (patient tracking) previously had to be done by hand and information was sometimes missed. Similarly in the Mobiles for Malawi project, patients with tuberculosis were tracked by health care workers using the system to record and report finding rather than the TB co-ordinator.

This allowed the co-ordinator to see another hundred patients over the course of the month. A third example that uses FrontlineSMS is JHPIEGO working with Marie Stopes International and Abt Associates. This is currently being piloted in Uganda and aims to support knowledge retention for trained Community Health Workers (CHWs) through quizzes and questions requiring SMS responses taken after a training session.

Advantages:
• Does not require additional infrastructure
• Relatively cheap hardware costs
• Ease of patient tracking and support
• Provides status and thus validity to community health workers.

Disadvantages:
• Currently limited in the terms of training applications that can be offered.

Developers
FrontlineSMS and various non-government organisations.

Intended audience
In the medical domain in SSA, applications have been developed predominantly for CHWs.

Indicative costs
This may not equate to the development of e-learning applications but illustrates the potential in terms of money saving and reach using mobile systems.

Development and maintenance

Production costs (time)
This was developed on the basis of FrontlineSMS technology and evolved from the requirements of the CHWs and hospital staff therefore there was little specific development time.

Production costs (hardware and software)
The FrontlineSMS software was made freely available and developed on a standard laptop.

Maintenance costs (content)
This is non-applicable.

Infrastructure costs

Hardware and software costs for provider
A group of 75 CHWs working at St. Gabriel’s Hospital, as well as the HBC nurse, were each given a recycled Motorola Pebl mobile phone costing approximately US$40. Phone chargers were available at the hospital and were also distributed to certain CHWs. A laptop was given to the hospital.

There were no hardware faults with the mobile phones thus no further costs were incurred in that respect. However, US$250 was spent on 2,945 SMS messages. This is a low cost option, unlike using a mobile phone that has 3GS capabilities.
CASE STUDY 6: (CONT.)

Hardware and software costs for student
The students were provided with the mobile phones.

Course cost to run
The CHWs were taught how to use their mobile phones, manage SMS messages, and understand how the FrontlineSMS network operates. Hospital staff were trained to manage all communication activity within about two weeks on the GSM-connected laptop running the FrontlineSMS software.

Over six months the study calculated that 2,048 worker hours were saved in the antiretroviral therapy (ART), home-based care (HBC) and tuberculosis (TB) treatment departments and US$3000 in fuel savings.

Alternatives and comparative costs

Low technology
This is non-applicable, as the system uses low end phones already and, as long as there is network coverage, it will be more efficient to enter data via a mobile device rather than type directly on the nearest computer or fill in paper forms and collate.

High technology
Using a GSM modem with a laptop, notebook or netbook would enable the health worker in the field to access and enter information and review notes and relevant text more easily and process and view patient histories or overall patterns of disease spread.

Advantages:
• Can view data more easily when in the field.

Disadvantages:
• Requires greater internet coverage than the FrontlineSMS option which uses the more extensive phone network
• Hardware more expensive.

For further information see:
For Mobiles in Malawi:
http://mobilesinmalawi.blogspot.co.uk/  
(This blog is no longer being updated but it documents the project in depth.)

http://medic.frontlinesms.com/resources/  
For TulaSalud:
http://www.tula.org/tulasalud.html
http://www.tulasalud.org/  
For JHPIEGO:
http://www.jhpiego.org/  

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Developing e-learning in palliative care education in sub-Saharan Africa

Diploma/MPhil in Palliative Medicine (University of Cape Town)

Overview
Both the Postgraduate Diploma (PGD) and the MPhil course follow a distance-learning model. This comprises web-based learning (internet access is a prerequisite) with a five-day workshop held every six months during the course. Reading material, comprising background information on each topic and relevant journal articles, is uploaded to the Vula website at the start of each semester. These articles form the basis of the learning experience. They are supplemented by face-to-face workshops held at the University of Cape Town and through the Vula virtual learning environment. Students use Vula to communicate and there are discussion forums, for example, facilitated by the lecturers around case studies. Regular case-based assignments are an important component of in-course assessment.

Both courses started in 2001 and the curriculum undergoes regular review. In 2009 the one-year PGD was restructured to offer one core module – Principles of Palliative Care (presented in semester 1) and one of two elective modules – Clinical Palliative Care and Paediatric Palliative Care (presented in semester 2.) Although the elective module means that not all students cover clinical aspects of paediatric palliative care, it does mean that more students can be accommodated on the course. The PGD or equivalent from another tertiary institution is the entrance requirement for the MPhil in Palliative Medicine.

In order to pass the PGD the student must pass each element of assessment: i.e. eight written assignments; a Personal Learning Portfolio; a written examination; and a communication skills assessment comprising two simulated consultations. The Personal Learning Portfolio is based on one or two patients’ histories - coming from their existing patients. This portfolio is presented toward the end of the course to assess the participant’s development of knowledge, skills, and attitudes essential to the effective and compassionate delivery of palliative care. It is submitted in hard copy as this allows for a variety of supporting documents to accompany the reflective learning ‘case reports’. These include art work, poetry and music. There is flexibility in presentation style for this creative but scientifically substantiated portfolio of learning.

The course work for the MPhil comprises a module on research methods (including research ethics) and a module on advanced palliative care (including issues of policy development and palliative care advocacy). The research component requires the submission of a dissertation.

Advantages
• It strengthens palliative care practice in the student’s workplace
• The personal learning portfolio illustrates that the student is a reflective learner, as they must integrate the palliative care knowledge taught into their clinical practice by documenting how they have integrated it into real patient interactions
• The rich material and poignant stories in the personal learning portfolios give the assessor a better understanding of students’ experiences and professional skills.

Disadvantages
• Need reasonable internet access
• Students have to get used to Vula, the online discussion forum
• The personal learning portfolio is a new concept for students, and they may be initially uneasy.

Developers
The University of Cape Town (UCT) in collaboration with the Palliative Medicine Division of the University of Wales College of Medicine in Cardiff, United Kingdom.

Intended audience
The programmes in Palliative Medicine were originally designed for experienced doctors

CASE STUDY 7:

Diploma/MPhil in Palliative Medicine (University of Cape Town)
who wished to gain expertise in the practical management of patients with non-curable and terminal illness, as well as some aspects of oncology and HIV care. The revised course is open to healthcare workers from all disciplines and focuses on the care needs of paediatric patients and of patients with HIV.

However, the MPhil is geared towards doctors working in hospices or in family medicine. This slant is to ensure that palliative care in Africa is considered earlier in the treatment of a life-threatening or life-limiting illness than is seen in developed countries.

The majority of students come from South Africa, but between 2001 and 2007 10% came from other African countries such as Zimbabwe, Uganda, Botswana, Namibia, Malawi, Tanzania, Nigeria, and Rwanda.

**Course length**
The year-long Postgraduate Diploma, which is designed for National Qualifications Forum level 8, requires 1200 estimated hours of study.

The MPhil is nominally a two-year degree. Although students are meant to submit a dissertation in the second year, not all students manage this, and are allowed to submit up to four years after first registering for the degree.

**Course qualification**
Depending on the course chosen and the quality of the coursework, students receive a Diploma or MPhil.

**Indicative costs**
**Development and maintenance**

**Production costs (time)**
There is no instructional design or bespoke software. Instructors put course resources and presentations online in the existing VLE.

They also set up weekly discussion forums using Vula, the bespoke online collaboration and learning environment used to support the University of Cape Town courses and communities.

**Production costs (hardware and software)**
The online aspect of the course comprises of WebCT. This is a commercial online virtual learning environment system which is sold worldwide. As stated, instructors, rather than course designers, can publish relevant documents and add tools such as discussion boards, mail and chat.

The system also uses the open source software Vula. Therefore production costs are predominantly licence fees.

**Maintenance costs (content)**
Again this is minimal, as it requires setting up students with unique accounts, and ensuring that material is up to date.

**Infrastructure costs**

**Hardware and software costs for provider**
These costs are factored into the university-wide on-line learning platforms. All undergraduate and postgraduate courses have on-line environments.

**Hardware and software costs for student**
The student needs access to a computer and the internet. This need not be their own machine.

**Course cost to run**
The tutors still have a major role, although this can be fitted around clinical practice and any other commitments. They have to ensure the material is online, mark the assignments, case studies and dissertations, organise the face-to-face sessions every six months and the end of course exams for the PG Diploma.

However, once the course is created, the effort to produce a discussion thread is minimal, and although moderation is required, this too is often minimal as the students contribute actively to discussion topics.

Online tutoring is as time intensive as classroom tutoring but can be arranged to a time that suits the tutors.
CASE STUDY 7: (CONT.)

Alternatives and comparative costs

Low technology
The personal learning portfolio is submitted in hard copy as this allows for a variety of supporting documents to accompany the reflective learning ‘case reports’.

The discussion forums could be replaced by an email exchange, or at a lower level of technology by the collation and sending of SMS text messages by the course tutor. Assignments and feedback could be sent as attachments, using freely available email software or even by CD/VD.

Advantages:
• Requires only intermittent internet access or even just access to SMS messaging.

Disadvantages:
• Reduces the range of tutor-student and student-student interactions.

High technology
A high technology solution would be the use of video conferencing and other real time exchanges to possibly enhance peer and tutor support. The creation of video online patients would illustrate the principles being taught given the difficulty in finding examples.

Advantages:
• Enhances the course by ensuring all students experience relevant material that they may not necessarily access in daily clinical practice
• Improves tutor-student and student-student communication.

Disadvantages:
• Time to develop virtual patients
• Broadband requirements
• Cost of video conferencing.

For further information see:
The Postgraduate Programme website – http://www.publichealth.uct.ac.za/students/students_pg_pallmed.php
For an evaluation report, see the 2007 paper from the Journal of Pain and Symptom Management: “Palliative Medicine Teaching Program at the University of Cape Town: Integrating Palliative Care Principles into Practice.” (pp. 558-562): (http://www.hospicepalliativecaresa.co.za/pdf/publications/GwytherRawlinson.pdf)

<table>
<thead>
<tr>
<th>Cost of development - material and any software</th>
<th>Reuse</th>
<th>Recreate using existing system</th>
<th>Low tech alternative</th>
<th>High tech alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>High - development of case studies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Reuse</th>
<th>Recreate using existing system</th>
<th>Low tech alternative</th>
<th>High tech alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low - as Vula open source software</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium - creation of case studies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Reuse</th>
<th>Recreate using existing system</th>
<th>Low tech alternative</th>
<th>High tech alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium (due to face-to-face aspect, marking and moderating online discussion)</td>
<td>Medium (due to face-to-face aspect, marking and moderating online discussion)</td>
<td>Medium (due to face-to-face aspect &amp; marking) SMS messaging, if used, would have associated costs.</td>
<td>Medium - broadband of sufficient width for video conferencing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost to student</th>
<th>Reuse</th>
<th>Recreate using existing system</th>
<th>Low tech alternative</th>
<th>High tech alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium (internet cost)</td>
<td>Medium (internet cost)</td>
<td>Low - can be done with sporadic internet access. SMS messaging would increase cost</td>
<td>Broadband of sufficient width for video conferencing</td>
<td></td>
</tr>
</tbody>
</table>
INTRODUCING E-LEARNING IN SSA

This report has introduced the concepts behind e-learning and illustrated its current use. This final section looks at questions to be addressed when planning e-learning.

How to enhance an existing course with technology and suggestions for reducing costs are also discussed.

General considerations
This section discusses areas to address when thinking about buying, commissioning or developing an e-learning course, possibly by putting an existing palliative care course online. There are no hard and fast rules (or answers). However, there are standard considerations that will influence the choice of e-learning platform and the course structure or whether an existing e-learning course could be run to achieve the identified learning objectives.

It builds on the issues identified in the workshop held as part of the Distance Learning for Health (DL4H) programme in 2010 on the potentials and problems in this field: They are whether the e-learning:

- Responds to the needs and circumstances of learners (including their ability to pay)
- Devotes resources to formative research and evaluation
- Gets the instructional design right (mixed media, face-to-face support, well-designed materials)
- Makes sure the logistics work
- Seeks integration
- Has political support and support for learners in how to pursue it.

These can be addressed by answering the following questions:

- What are the needs of the learner, that is, what do they require from the course? This is equivalent to the learning objectives decided prior to designing any course
- How will it be assessed? This is in terms of:
  - What the student has learnt as a consequence of doing the course? This could be measured, for example, by the responses to an online exam, a marked essay, contributions to message boards, examples of behaviour taken from practice and independently assessed
  - The effectiveness of this mode of delivering the training? This could be a comparison with existing schemes in terms of the marks achieved or student satisfaction
- Is it scaleable? Will the resource be applicable to a wide range of students across the relevant geographic region?
- What resources have you available for the course? What hardware and infrastructure is available? Who will be responsible for paying the cost of fixing or replacing broken equipment? Who will ensure the infrastructure (such as the mobile coverage, software licenses, internet connections), that might be needed in order for the technology to support the e-learning system, is satisfactory? Are there sufficient funds for peripherals such as printers, spare phone chargers? Where will material such as recordings of experts that are course resources be hosted?
- Who will be responsible for training staff to mentor, or create content? Will this involve a culture shift for staff and if so how can this be addressed effectively?
Developing e-learning in palliative care education in sub-Saharan Africa

- What hardware and infrastructure is available to the students? Will they be able to access online material easily? Will they have to print the material sent to them? Are there resource centres where they can access the course? Will they have to pay to complete the course?
- What will happen if a computer stops working or internet access is lost?
- How will the course be integrated into current teaching? Will it be part of a blended learning approach where face to face sessions will be held? Will a prerequisite for attending be successful completion of the e-learning aspect? 37
- What will the impact be on existing course providers?

Once these questions have been addressed, the next choice is to decide who will develop and maintain the course -- will it be yourself or an external agency? This will depend upon:

- Cost of content development - including staff hours to create a course compared to buying or adapting an existing course. The larger the number of students that the course is applicable for and the lower the cost per student head, the more likely that in-house course development costs will be justifiable
- Cost of ongoing maintenance of content: again in terms of man hours if the course is developed in-house or to buy if externally sourced. For example, if an e-ELCA subscription has been purchased there are no further costs for maintenance and licensing
- Cost of hardware and its maintenance: this can be to buy or lease (thus upgraded automatically)
- Cost of ongoing maintenance of hardware and licences
- Cost of running course: including relevant training for staff and students in terms of staff hours and cost and the time taken to manage, mentor, facilitate etc by staff. This cost increases if there is a face-to-face element as the staff will have greater numbers of students to see
- Required flexibility: development and maintenance in-house will generally provide greater flexibility but, depending upon the situation, may be less reliable than contracting an external company
- Availability of the necessary technical skills locally vs availability of the funds needed to pay external companies for their services
- Availability of existing hardware, software and technical expertise which can be expanded or added to
- Locally available infrastructure which is sufficiently reliable to provide 24/7 service to learners.

Considerations when converting existing courses to online

One approach to creating courses is to convert an existing face-to-face course to one that uses e-learning.

Questions that could be asked as part of this process are:

**Review of content and structure**

- What is the current mode of data transmission and assessment? Can it be converted to an online format as it stands, for example, if it is to read a text or view a lecture, or will it need to be revised, for example, lecture notes converted to bullet points with ongoing mini-quizzes to ensure information has been learnt?

**Technical**

- How to record and edit lectures and presentations by experts
- How to publish these and update as necessary
- How to decide in which medium/media to situate the course
- How to ensure that any images or texts used do not infringe copyright or IP.

**Infrastructure**

- Where will the learning material be accessed from? Have students the necessary hardware/software, internet access, electricity supply, etc?
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- How frequently will the lecturers need to update the learning material? Online updating is relatively straightforward, but if reliant on DVDs or CDs being sent or printed, this may be a significant issue.
- Will there still need to be a face-to-face element? If so how will this be arranged?
- Will there need to be a clinical element? If so, how will this be monitored?

**Teacher training (if required)**
- To use the technology, not just writing courses but accessing e-portfolios, pulling off data about course completion etc.
- To facilitate online forums.

**Student training (if required)**
- To access and contribute to forums, blogs, wikis etc.
- To upload and download materials if required.

**Assessment - How to assess students’ ability/achievement reliably.**
- Computer marking deals better with multiple choice than free text questions.

---

Table 6: Comparison of general and e-learning techniques

The following table demonstrates how 'traditional' techniques might be converted into e-learning techniques. For example, if you would create the course outline as a paper document in a face-to-face course, it could be done as a web page if the course had an online presence.

<table>
<thead>
<tr>
<th>‘Traditional’ techniques</th>
<th>E-learning techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Announcement</td>
<td>Flyer</td>
</tr>
<tr>
<td></td>
<td>Mail</td>
</tr>
<tr>
<td></td>
<td>Phone</td>
</tr>
<tr>
<td>Registering</td>
<td>Register</td>
</tr>
<tr>
<td>Overview session</td>
<td>Traditional classroom lecture</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Course outline</td>
<td>Paper document</td>
</tr>
<tr>
<td>Course outline</td>
<td>Webpage</td>
</tr>
<tr>
<td>Reading list</td>
<td>Paper document</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-paced learning</td>
<td>Articles</td>
</tr>
<tr>
<td></td>
<td>Books</td>
</tr>
<tr>
<td></td>
<td>Job-aids</td>
</tr>
<tr>
<td></td>
<td>On-the-job training</td>
</tr>
<tr>
<td>Query resolution</td>
<td>Face-to-face meeting</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continued overleaf
Tips for ways to reduce costs:
There are costs associated with e-learning in terms of hardware, development and maintenance. Possible ways of minimising these include:

- Group together with other hospitals, universities and palliative care organisations for group discount on licences – these are usually cheaper per individual when more are bought – and to share content creation costs
- Adopt open source solutions wherever possible if the availability of technical staff is less of an issue than the availability of money for licences – there is very little in e-learning for which an open source equivalent to commercial software doesn’t exist
- Tap into the technical expertise of students on technical courses. For example, the EPROM course, designed by the Massachusetts Institute of Technology, teaches how to create mobile phone applications. It may be possible to commission students to create suitable applications[^38]
- Adapt existing e-learning systems that are already context sensitive – seeing what others are doing in e-learning (e.g. e-Learning in Africa conference) and adapting it
- Share the bulk of the course (as in HEAT where 90% is generic) so that it can be adapted easily by others
- Crowd-source’ material, that is, encourage experts to contribute and comment on relevant areas. This is the approach behind ‘wikipedia’
- Do not attempt to ‘build a Rolls Royce when a Toyota will do’. That is, develop only the functionality which is necessary, for example, if there are only likely to be a few hundred students on a course do not build a system which will support tens of thousands
- Structure peer marking and peer moderation of forums into the course to reduce staff resource required.
ADDITIONAL E-LEARNING RESOURCES

Academic research in the area of e-learning in SSA

Africa Health (http://www.africa-health.com) – a journal that has discussed e-learning in articles such as “Turning the HEAT up for frontline health workers in Ethiopia”. (http://www.africa-health.com/articles/may_2011/HEAT.pdf)

The Sub-Saharan African Medical Schools Study (http://www.samss.org) – a portal for information on medical education in sub-Saharan Africa. It contains their survey results and lists reports and articles on the current medical education practice or about innovations and trends that will shape the future of medical education in Africa.

Human resources for health (http://www.human-resources-health.com/) – a journal which discusses distance learning in articles such as “Building capacity without disrupting health services” public health education for Africa through distance learning (http://www.human-resources-health.com/content/7/1/28)


Organisations that are encouraging e-learning in SSA


African Palliative Care Association (http://www.apca.org.ug)

The International Conference on ICT for development, education and training (http://www.elearning-africa.com/)

Information around mobile learning for health in SSA

mLearnEd video presentations (http://www.iheed.org/video_iheed.html) – the presentations to the 2011 mLearnEd conference held in South Africa.

Mobile health projects in low resource countries (http://www.mhealthinfo.org/projects_table)

The report Mobile Health Education: Harnessing the Mobile Revolution to Bridge the Health Education & Training Gap in Developing Countries (http://www.mobileactive.org/files/file_uploads/iheed_report_updates.pdf)
GLOSSARY

This section elaborates the terms used in the report relevant to the hardware, software and infrastructure that is used in e-learning.

As well as descriptions it has examples of how these technologies have been used in palliative care training. Where relevant there is also a discussion of the costs to use these technologies.
TOOLS FOR DELIVERING CONTENT

Text: e-books
E-books, also called electronic or digital books, are publications in digital form which are typically the length of the traditional book. They can consist of text, images, and in some cases video. They are produced on, published through, and readable on computers, mobile phones or electronic devices dedicated to the task, such as the Kindle.39

They can exist electronically as a conventional printed book, but need not have a printed equivalent. Formats vary, with each eBook reader favouring its own format, but epub, pdf and txt are open standards recognised by most readers.

There are numerous tools to create and manage eBooks, including those specific to each device. However, one creation route using open source software which works on most platforms is to create the book in OpenOffice (http://www.openoffice.org), convert it to epub using the Writer2ePub extension (http://extensions.services.openoffice.org/en/project/Writer2ePub) then tidy it up if necessary in Sigil (http://code.google.com/p/sigil/). If you are aiming to release the ebook through Amazon Kindle, they offer a free conversion facility.

Presentations
Recording over presentation and screen capture software
One of the simplest ways to turn a presentation which is normally delivered face-to-face into something which can be viewed online is to record a narration over the slides or demonstration.

Packages such as Microsoft PowerPoint (http://office.microsoft.com/en-gb/powerpoint/) allow anyone armed with a microphone to record their voice synchronised with changes in slides and will output this in a format which can be replayed or converted (using a tool such as iSpring http://www.ispringsolutions.com/- which is commercial but has a free version) into a feature which will play on a web page.

Alternatively, packages such as Camstudio (http://camstudio.org/ - open source) and Camtasia (http://www.techsmith.com/camtasia.html) will record anything which can be displayed on a computer, along with a voice or text labels, and convert it to a video.

Further information on these tools can be found here: http://c4lpt.co.uk/directory-of-learning-performance-tools/instructional-tools/.

Table 7: E-book costs

<table>
<thead>
<tr>
<th>Cost of hardware &amp; software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low. If delivering on CD/DVD then £ No. of students</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>

Table 8: Presentation recording costs

<table>
<thead>
<tr>
<th>Cost of hardware &amp; software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low. If delivering on CD/DVD then £ No. of students</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>
Podcasts
Podcasts are series (e.g. weekly) of pre-recorded audio or video programs that can be listened to on the media player installed as standard on most personal computers or mobile devices. They are different to other audio and video on the web in that users can subscribe to the series. When a new one is released, it can be automatically fetched by subscriber’s computer or mobile device by podcatcher software, the most popular of which is iTunes.

Podcasts can be stored on external sites, for example iTunes stores multiple podcasts on palliative care from around the world as well as the Canadian Conversations on Caring podcasts or videos on iTunes (http://itunes.apple.com/us/podcast/conversations-on-caring-canadian/id469074056 or http://itunes.apple.com/gb/podcast/canadian-pallium-project-video/id471062345) or they can be hosted on the provider site, for example, the Palliative Care Victoria pages – http://www.pallcarevic.asn.au/podcasts/.

Video podcasts can be created by any of the methods described in Recording over presentation and screen capture software (on page 37) and Recording live lectures (above). There are also many websites that describe exactly how to create audio podcasts, for example, http://www.ilounge.com/index.php/articles/comments/beginners-guide-to-podcast-creation/ or http://radio.about.com/od/createyourownpodcast/ss/How-to-Create-Your-Own-Podcast-Make-Your-Own-Talk-Show-Music-Program-or-Audio-Stream.htm. 1.3 Interactive material.

Table 9: Recording live lecture costs

<table>
<thead>
<tr>
<th>Cost of hardware &amp; software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium/ High for enterprise-level systems</td>
<td>Low</td>
<td>Medium/ low for enterprise-level system</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>

Table 10: Podcast costs

<table>
<thead>
<tr>
<th>Cost of hardware &amp; software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low - commercial solutions are relatively cheap</td>
<td>Low</td>
<td>Low. If delivering on CD/DVD then ∝ No. of students</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>
Developing e-learning in palliative care education in sub-Saharan Africa

**Authoring tools**
The vast majority of e-learning materials are developed using a range of software packages called authoring tools. These are aimed at technically competent teaching staff who want to combine text, images, audio, video, simple interactions and questions into discrete learning objects. These generally use a ‘page’ metaphor in which learners move through the package page by page, often with questions as gatekeepers before moving on from basic to more complex material.

There are two main approaches taken by authoring tools - those that take existing materials and convert them and those that expect authors to start from scratch.

**Convertors**
These take materials that will generally have been used for face to face teaching (e.g. PowerPoint presentations) or will allow e-learning packages to be written in e.g. Word with a plugin that provides extra functionality. They then convert them (with varying degrees of automation) into something which will run in VLE. Examples are Articulate (http://www.articulate.com/ – commercial) and Wimba Create (http://www.wimba.com/products/wimba_create – commercial).

**Creators**
Arguably more difficult to get started with, but generally more powerful than the convertors, this group of authoring tools expects the teacher to enter material from scratch, although this will commonly be by copying and pasting from existing teaching materials in e.g. PowerPoint. The range of tools in this category is much wider and includes two notable open source options, eXe (http://exelearning.org/wiki) and Xerte (http://www.nottingham.ac.uk/xerte/) as well as the very widely used Adobe Captivate (http://www.adobe.com/products/captivate.html).

Further information on authoring tools can be found here: http://c4lpt.co.uk/directory-of-learning-performance-tools/instructional-tools/

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**Table 11: Authoring tools costs**

<table>
<thead>
<tr>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (Medium for commercial systems)</td>
<td>Medium</td>
<td>Low</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>
Simulations and games
A simulation is a programme that models a process allowing for various user inputs and variables. A common example is a flight simulator; this does not just produce possible outcomes for a flight, but takes into account the action of the pilot - either real or in another simulation.

Games are often built upon simulations. By their very nature games are designed to be engaging, and, as already illustrated by iCases and Virtual Patients (Malawi), although they may not have the depth of a full simulation, they can have a sufficient degree of accuracy for the player to make relevant decisions. (Note that games here do not refer to games without a degree of reality, such as snakes and ladders, where progress is random, or by correctly answering an unrelated question.)

The Center for the Advancement of Distance Education (CADE), which is a self-supporting unit within the School of Public Health at the University of Illinois at Chicago, designed the Public Health Games in the US (www.publichealthgames.com). They say games containing lifelike simulations can (http://www.publichealthgames.com/benefits/):

- Facilitate experiential learning
- Allow variation in task execution skills
- Show relationships between parties with conflicting priorities
- Reveal ambiguities in communication
- Force time-critical dependencies
- Create circumstances and scale that are impossible in real life training exercises
- Measure indicators and track them over time.

The freely available games they design can be played online or distributed on DVD, so there is less of an infrastructure issue.

Currently there is a game under development in the US on palliative health care. It will simulate home care visits on: dementia and acute agitation, dementia with pain, falls, and transitions of care (http://champ.bsd.uchicago.edu/PalliativeCare/index.html). This cannot be transferred directly to the SSA context but is indicative of the material that could be produced.

Given the lifelike simulations required, games are usually expensive. Thus many serious games for the health sector can only be played by those who commissioned them, for example, Triage Trainer designed by TruSim (a division of Blitz Games) - http://www.trusim.com/?page=Demonstrations. However, we do have information on the success of Triage Trainer; see http://sgiwiki.cueltd.co.uk/papers/science.pdf or http://www.sciencedirect.com/science/article/pii/S0300957210002406.

Or there are those games designed for purchase, e.g., the US course QPRT Suicide Risk Assessment and Management Training Program (http://www.qprinstitute.com/Joomla/index.php?option=com_content&view=article&id=312&Itemid=118).

---

Table 12: Simulations/games costs

<table>
<thead>
<tr>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Cost of development - material &amp; any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
TOOLS FOR ASSESSING LEARNING AND TEACHING

Self-test questions
The vast majority of interactivity in e-learning materials is provided by self-test questions in one form or another. These are two main types – multiple choice and open-ended.

Multiple choice
These are questions in which users are given a list of options from which to choose the correct answer. Computer marking of these question types is relatively easy. These include the typical best of five multiple choice questions and multiple response questions (see Figure 3) in which users are asked to ‘tick all that apply’. Multiple choice also includes two question types which are widely used in medical education – extended matching and drag and drop.

Figure 3: Typical multiple response question
**Extended matching questions**

Simple multiple choice and multiple response questions are often criticised for the potential for users to eliminate incorrect answers, making it easier to guess the correct answer. Extended matching questions attempt to address this problem by presenting users with a large number (8+) of equally likely answer options. The question is then composed of a number (3+) of question stems or questions items, which are typically a short case-history or vignette, to which one of the options is the answer. The idea is that, with so many potential answers, elimination would be too difficult and/or time-consuming and therefore participants have to know the correct answer and then identify it among the list of options. They are often written by committee and the process often begins with developing the list of likely options. However, not all subject areas lend themselves to extended matching questions.
**Drag and drop**

Drag and drop is the adult e-learning equivalent of shape-posting games for infants. The idea is that to answer the question you ‘pick up’ an answer with your mouse, and **drag** it over to the correct position (normally one of a number of empty boxes or ‘drop zones’) and then **drop** it into place. Figure 5 (below) is fairly typical of the type and shows a learner being tested on the end-of-life care pathway and dragging the key stages into the correct order. Once the user presses **submit** the correct answer is shown on the right, allowing the user to make a comparison. Another good use of this question type is in testing whether learners can correctly label diagrams.

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**Figure 5: Example of drag and drop question**

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![Drag and drop example](image-url)
Open-ended questions
These are questions where students have to provide an answer without any cues and are therefore often thought of as closer to real life. They are often more challenging than multiple choice questions to computer mark.

At the simplest level, model answer questions pose a question which the learner is supposed to answer, either in their head or by typing into a box, before clicking a button to see the correct answer. These questions are not normally computer-marked.

Numerical questions, where the learner types a number as an answer, are relatively easy to mark, although units and different notations can cause problems. Hotspot questions are used like drag and drop questions to allow learners to indicate on a picture or diagram where something is. Free text questions where learners answer with a word or possibly two can be marked by computer reasonably reliably. Marking longer pieces of text is possible using software such as http://www.intelligentassessment.com/

Most virtual learning environments feature the majority of these question types as do stand-alone assessment tools such as QuestionMark Perception (http://www.questionmark.co.uk - commercial), Rogo at http://www.nottingham.ac.uk/rogo/index.aspx - open source) and the Open University’s open source OpenMark system: (http://www.open.ac.uk/openmarkexamples/).

More assessment tools are described at: http://c4lpt.co.uk/directory-of-learning-performance-tools/instructional-tools-testing-quizzing-other-interactivity-tools/

Collecting student feedback on the course
Student feedback on a course is critical both for quality control and as a method of collecting evidence about the success of e-learning. While the packages used for assessment can do this, most VLEs usually have separate ‘survey’ tools which will collect and analyse feedback from students.

There is also a variety of ‘cloud-hosted’ survey packages such as SurveyMonkey (http://try.surveymonkey.com/) which offer limited free functionality.

Table 13: Assessment system costs

<table>
<thead>
<tr>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hosted locally High-hardware</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Hosted externally High - license (∞ to No. of participants)</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
TOOLS FOR COMMUNICATING AND INTERACTING WITH STUDENTS

Blogs
A blog (short for weblog) is an online journal or log intended for general consumption. The content can focus on anything, from random thoughts to reviews of current affairs and technological advances. Blogs are defined by their format: a series of entries posted to a single page in reverse-chronological order. These are often categorised or tagged allowing readers to search by subject as well as date. The author of a blog is often referred to as a blogger. Blogs can link to external sites, and allow others to post comments or reactions at the end of each entry. Blogs can be set up so that only named individuals can view the site or individual posts, or be made freely available to any internet user. A blog can allow multiple authors to publish to the same blog.

For an example of a relevant blog see the BMJ Supportive & Palliative Care Journal blog (http://blogs.bmj.com/spcare/). This contains posts to other useful examples and news related to palliative care.

With respect to e-learning blogs can be used by students to record daily practice, patient progress (with relevant permission), or responses to set reading lists. Their peers and instructors can follow progress and comment.

One of the most popular pieces of blog authoring software, WordPress (http://www.wordpress.org), can be hosted within your organisation or you can get a free hosted account at http://www.wordpress.com. Free, hosted alternatives include Google’s Blogger (http://www.blogger.com/), the ‘microblog’ system Twitter (http://www.twitter.com) and the social network Facebook (http://www.facebook.com) which includes blog features.

In addition most content management systems and virtual learning environments include some sort of blogging tool.


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Table 14: Cost of using blogs within e-learning course

<table>
<thead>
<tr>
<th></th>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Cost of development - material and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wordpress own server</td>
<td>Low</td>
<td>n/a</td>
<td>Low</td>
<td>Low (∝ broadband cost)</td>
</tr>
<tr>
<td>Blogger hosted</td>
<td>None</td>
<td>n/a</td>
<td>Low</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>
**Internet forums or message boards**
These are online discussion sites where people can hold conversations in the form of posted messages. These messages are archived (unlike those in chat rooms), and posts may have to be approved by a moderator before they are made visible. Forums can be totally open or they may be restricted, that is, you need a login to view, so that only registered users can post messages.

A discussion forum is hierarchical or tree-like in structure. Thus from the top several topics can branch off into subforums, and these again divide into further topics. Each topic, or conversation, is called a thread, and can be replied to by as many people as wish. In flat forums new posts are added to the end of the list. In threaded forums the posts relate directly to the one being responded to, and usually appear indented under the previous post. Forums usually enable searches to be conducted, hyperlinks to be included, and sometimes images inserted.

Forums can be used in an e-learning setting by requiring learners to feed back on the required reading as in the communication course run by the Marie Curie nurses for their staff. The moderator could post subject areas to respond to, requiring the learner to comment on their own understanding in the area or respond to that of their colleagues. Moderators could also encourage participation and ensure the content of the posts is valid in that context.

Alternatively forums can be used as a resource. To illustrate this, the forum at the US Centre to Advance Palliative Care ([http://www.capc.org/forums/](http://www.capc.org/forums/)) is designed for members to post questions on one of the root topics (there are currently 17, e.g. Designing a Program, Billing and Finance, Staffing) to which other members can respond.

Examples of hosted forum software include the free Google Groups ([http://groups.google.com/](http://groups.google.com/)) and Forumcommunity ([http://www.forumcommunity.net/](http://www.forumcommunity.net/)). If wished, open source software for creating forums is also available. For example, vanilla forums provide the software as well as hosting communities ([http://vanillaforums.org/](http://vanillaforums.org/)). For a comparison of the various options and a tool for selecting an appropriate forum, see [http://www.forum-software.org/](http://www.forum-software.org/).

To see how discussion forums could be used from a teaching perspective, view the University of Hertfordshire’s how-to guide at: [http://www.herts.ac.uk/fms/documents/teaching-and-learning/lti/Online-discussion-guide.pdf](http://www.herts.ac.uk/fms/documents/teaching-and-learning/lti/Online-discussion-guide.pdf).

**Webinars**
Webinars are web-based seminars, in which there is two-way communication between presenters/hosts and participants (for an online description see: [http://www.youtube.com/watch?v=8vklEZ2z33o](http://www.youtube.com/watch?v=8vklEZ2z33o)). They are ideal for tutorials or small group teaching at a distance whether all participants are geographically distant or just the tutor, Webinar software tends to include the following features as a minimum:

- ‘Presenter’ can show a presentation or an application running on their machine
- Depending on bandwidth and technology requirements, participants can see each other through webcams, hear each other through microphones and headphones/speakers and or ‘chat’ by typing in a text box
- Tools which allow users to vote on issues, indicate agreement or disagreement, put their hands up to request permission to speak/present and even applaud
- The facility to record sessions so that those unable to attend can watch later – possibly as part of a series of podcasts.

While initially aimed at personal computers, these technologies are increasingly available on mobile devices.

STUDENT-CONTRIBUTED CONTENT

Wikis
A wiki is a simple website that allows users to add and update content on the site using their own web browser. They also record the changes being made, allowing previous versions of the page to be compared. The content can be links to other sites, text, images, embedded video etc.

Wikis end up being created mainly by a collaborative effort of the site visitors. Wikis can be restricted to certain groups. An example of a wiki around palliative health care would be the pages on death and dying in the Health Education Library for People (HELP) wiki [http://helpebook.wetpaint.com/page/Death+and+Dying](http://helpebook.wetpaint.com/page/Death+and+Dying).

In an education setting wikis are often used by groups of students to create their own reference text or study guide around a topic set by the instructor. However, it should be noted that as wikis are a different mode of working to the normal production of text, students often need support to learn how to review each other’s work, identify gaps in knowledge of a topic or find ways of making the different topics relevant to each other.

Wiki software can be minimal. The Wikimatrix ([http://www.wikimatrix.org/](http://www.wikimatrix.org/)) allows the selection of appropriate wiki tools. However, like blogs they need a host server. Again the host server can be within the existing domain, but it will cost to host elsewhere.

ePortfolios

ePortfolios are web-based systems which generally serve two major functions:

- Collation of evidence about an individual’s leaning and abilities
- A space where individuals can reflect on what they have already learnt/achieved, set goals and plan personal development.

The audience for the content ranges from the individual themselves, through their peers to those responsible for signing off and assessing competence/achievement. Making all or parts of a portfolio visible to others and receiving comments and feedback on evidence are commonplace. Portfolios are increasingly mandatory components of continuing professional development.

In UK health care, the largest is the NHS ePortfolio [41] which is used by more than 35,000 health care trainees, including foundation level doctors for whom it is an important part of assessing their competencies.

Popular alternatives on a more modest scale include the commercial PebblePAD ([http://www.pebblepad.co.uk/](http://www.pebblepad.co.uk/)) and the open source software Mahara ([http://mahara.org/](http://mahara.org/)).

<table>
<thead>
<tr>
<th></th>
<th>Cost of hardware and software - incl. maintenance</th>
<th>Cost of development - materia and any software</th>
<th>Cost of running course - delivery, moderators, etc.</th>
<th>Cost to student</th>
</tr>
</thead>
<tbody>
<tr>
<td>PebblePAD</td>
<td>High-license cost</td>
<td>Low - some simple configuration</td>
<td>Low - depending of level of feedback</td>
<td>Low (∝ broadband cost)</td>
</tr>
<tr>
<td>Mahara</td>
<td>Medium-installation</td>
<td>Low - some simple configuration</td>
<td>Low - depending of level of feedback</td>
<td>Low (∝ broadband cost)</td>
</tr>
</tbody>
</table>
BRINGING THEM ALL TOGETHER – VLE; MLE; LMS; CMS OR CMS

Virtual Learning Environments (VLE); Managed Learning Environments (MLE); Learning Management Systems (LMS); Course Management Systems (CMS); Content Management Systems (also CMS)

These terms are often interchanged. They are sets of teaching and learning tools designed to enhance a student’s learning experience by including computers and the internet in the learning process. Content management systems, such as the open source Drupal platform (http://drupal.org/), however, support the publication of material more easily than they manage learners’ data. The principal components include:

- curriculum mapping (breaking curriculum into sections that can be assigned and assessed)
- student tracking
- online support for both teacher and student
- electronic communication (e-mail, threaded discussions, chat, Web publishing)
- internet links to outside curriculum resources.

The system is accessed through a unique teacher or student ID. The teacher can access all student generated content, and has additional user rights allowing them to create or modify curriculum content and track student performance.

There are a number of commercial software packages available, the most popular in higher education being probably Blackboard (http://www.blackboard.com/). WebCT, Lotus LearningSpace, and COSE also require a fee, the amount depending on the number of licences. However, open source packages such as Moodle (http://moodle.org/) are increasingly popular and deliver much of the same functionality with no licence fee. The inclusion of maintenance and support costs in the licence fee can raise the cost.

The University of Lancashire in the UK, for example, offers a distance learning doctorate in palliative care. Learners can view and access the course modules from one page (assuming they have the relevant login) (http://www.health-research-courses.net/). Similarly e-ELCA has a LMS for tracking student progress, needing a login. While the University of Cape Town, which offers a Diploma and MPhil in Palliative Medicine, uses Vula. This is the local name for Sakai, the international open-source LMS.

Vula allows students to:

- download learning materials for printing
- participate in asynchronous bulletin board discussions
- participate in synchronous chat groups
- perform occasional online exercises and exams.

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E-LEARNING TERMINOLOGY

Computer mediated communication (CMC)
Computer mediated communication (CMC) allows two or more people to interact with each other through separate computers across a network connection. It can be synchronous, that is, where learners receive information simultaneously and communicate directly with other learners, for example, in a chat room, instant messaging or by teleconferencing. This can be motivating – by having to keep up with peers, and it also makes participants feel part of the learning community, providing quick feedback, and encouraging students to keep up to date with the course. Or it can be asynchronous, where the transmission and reception of material are not simultaneous. Examples of this are email, blogs, discussion boards and wikis. The latter allows students to access material at their convenience, while the former requires an agreement of when to collaborate. Asynchronous communication allows flexibility, can take place at any time and anywhere. It gives time for the student to reflect, check references, or prepare comments and helps integrate course concepts into the working environment. It often uses less bandwidth/low-end computers so is more equitable.

Tagging
Tagging is the process of assigning a keyword(s) to a piece of content. This can be a blog post, website, module in a library of learning material, social bookmarking. Tagging enables users to search for relevant content. It can be restricted to existing categories, or allow the user to create a more useful term.

Tag clouds are boxes containing a list of tags with the most prominent or popular tags receiving a darker and bigger font than less popular tags. For example, the MedWorm blog shows the popularity of various topics across all its blogs (http://www.medworm.com/rss/blogtags.php?cloud=big&t=m). To access content click on the tag keyword to display a list of all articles tagged with that expression.

SCORM
Sharable Content Object Reference Model is a collection of standards for e-learning that are largely concerned with how e-learning content interacts with the VLEs/LMSs in which it is hosted. The two most important aspects of this model ensure that learners see the right content as it was intended to be seen and enable the VLE or LMS to track learners’ progress.
HARDWARE / PLATFORMS

Phones
Low end or basic phone
Allows voice calling, SMS and unstructured supplementary service data (USSD). USSD allows the phone user to respond to simple quizzes or surveys as well as receive extra airtime.

Feature phone
A low-end mobile device with standard voice calling, SMS and USSD as well as internet access allowing the sending of email and web browsing, but it does not have the computing power or screen size of a smartphone.

Smartphones
In addition to standard voice calling, SMS and USSD, the smartphone has an independent operating system (OS) (such as Mac OS X, BlackBerry, Android, Windows Mobile, Symbian and BREW and Palm WebOS) and often a larger screen size. The OS allows the user to access applications, for example, calendars, documents, videoconferencing. Moreover, it can multitask between applications and operations.

Laptop computers have the greatest computing power out of the three. They can hold more data and programmes than the other two. The others often rely more on cloud computing, that is the storage of programmes and data away from the machine but accessible through it when connected to the internet. Netbooks tend to be popular for tasks that do not require a lot of computing power, for example, reading or listening to material, word processing etc.

Tablet computers (iPads etc)
Unlike laptops, notebook and netbook tablet computers have touch screens through which the user interacts, including in natural handwriting with a stylus or digital pen and typing through a screen-based software keyboard. However, like laptops, notebooks and netbooks, they attach wirelessly to the internet and have operating systems allowing programmes and applications to run. The main categories of tablet computers are:

• Slate tablets (e.g. iPad) – lack a hardware keyboard although these can be attached
• Convertible tablets (e.g. Samsung series 7) can be used as a laptop or the screen can rotate 180 degrees and be folded over the integrated keyboard or the keyboard slid out of the way under the screen allowing use as a slate tablet
• Hybrid tablets (e.g. The Dell Inspiron Duo) – a notebook in which the display can be physically removed and function independently as a slate tablet
• Rugged tablets (e.g. Panasonic H2) – a slate-like model encased in a protective shell with shock-protected hard drives to allow rough handling and extreme conditions.

Computers
Laptop, Notebook and Netbook
All have the same structure: a screen and a keyboard attached by hinges. There are no specific sizes or weights to classify these technologies, but in general, netbook computers are smaller and lighter than notebook computers, which in turn are smaller and lighter than laptops. Netbook computers tend to be cheaper than notebooks, which are in turn cheaper than laptops. All have the capability to attach wirelessly to the internet and all have operating systems allowing programmes and applications to run.
**Desktop computers**
The standard office workstation is by far the cheapest way to get online.

**Mobile phone applications**
The BBC are one of the many organisations that have reported that Africa is the world’s fastest growing telecoms market and that mobile phones have transformed the lives of Africans everywhere. This is being enhanced by organisations such as m:lab who were created to support entrepreneurs develop innovative mobile applications (http://mlab.co.ke/pages/about.php). These include applications applicable to the health care and physical environment in SSA, for example, allowing patients to check the validity of medicines (http://mpedigree.org/home).

This suggests that these designers could adapt or create educational mobile phone applications in the area of palliative care. Existing applications, such as the online book PalliApp and the associated PalliCalc, or the set of flash cards in the Palliative Care App (http://itunes.apple.com/gb/app/palliative-care/id339825596?mt=8) could be used. If PalliApp and PalliCalc become popular they will in time be converted into formats which work on other handheld devices.

Accessing applications is not complex. There are multiple sites from which they can be downloaded, for example, iTunes and appshopper.com. It should be noted that applications released through iTunes (e.g. iPhone, iPad) have to undergo testing by Apple before being released. The extent to which other applications are tested varies.

The cost of creating a mobile phone application is dependent on its complexity. As a rule of thumb, the greater the interactivity, the greater the cost.
ENDNOTES


2. The Marie Curie Nurses are funded by a UK charitable organisation to provide practical and emotional support for those dying and their carers in their own home.

3. See the case study Virtual Patients (Malawi), on pages 23-25.

4. A walkthrough is available and the software is currently being extended to allow external users, see [http://emsd.medsci.ox.ac.uk/systems/divisional/cases] for further details.

5. See [http://www.elearning-africa.com/] for a description of the conference and links to past proceedings.

6. mHealthEd was the first dedicated conference on the emerging phenomenon of mobile Health Education in developing countries and took place on June 6 2011 in Cape Town [http://www.mhealthed.org/pres_mhealth.html].

7. For a full breakdown of ownership, see [http://www.gallup.com/poll/149519/mobile-phone-access-varies-widely-sub-saharan-africa.aspx].


10. The numbers of providers is increasing; see [http://manypossibilities.net/african-undersea-cables/] for a map of providers for East Africa and West Africa.

11. The SSAMs project is an analysis of the responses from 105 medical schools in the SSA region around the challenges, innovations, and emerging trends found in medical education in the region. For further information on the project, see the SSAMs project home page – [http://samss.org/].

12. This was a key limitation identified by the review of Tanzanian distance learning in 2009, see [http://www.go2itech.org/resources/publications-presentations/articles-and-reports/DL_reportFULL414_FINAL.pdf].

13. This is described in detail in the third case study, AMREF - KECHN (Kenya Enrolled Community Health Nurse) Certificate to KRCHN (Kenya Registered Community Health Nurse) Diploma eLearning Upgrading Programme, on pages 18-19.


Developing e-learning in palliative care education in sub-Saharan Africa


For details of the HEAT project, see [http://www8.open.ac.uk/africa/heat/](http://www8.open.ac.uk/africa/heat/).


The course can be found on the Stanford University pages ([http://endoflife.stanford.edu/Moo_overview/intro_lrn_overv.html](http://endoflife.stanford.edu/Moo_overview/intro_lrn_overv.html)) An example of the use of video would be James Benton, [http://endoflife.stanford.edu/Moo_overview/Case1_02.html](http://endoflife.stanford.edu/Moo_overview/Case1_02.html). This resource is free of charge to affiliates of the US Veterans Administration who funded the work. For licensing information see [http://endoflife.stanford.edu/terms_of_use.html](http://endoflife.stanford.edu/terms_of_use.html).

Medical simulations and animations are becoming more common in the developed world, with companies creating them for training use ([http://www.interactmedical.com/](http://www.interactmedical.com/)) and Biodigital ([http://www.biodigital.com/](http://www.biodigital.com/)).

There is a discussion on games in the glossary on page 40. For a demonstration of the games see [http://www.trusim.com/?page=Demonstrations](http://www.trusim.com/?page=Demonstrations).

For details please see the paper “Using e-learning develop communication skills when assessing patients’ end of life care” ([http://www.nursingtimes.net/using-e-learning-to-develop-communication-skills-when-assessing-patients-end-of-life-needs/5020571.article](http://www.nursingtimes.net/using-e-learning-to-develop-communication-skills-when-assessing-patients-end-of-life-needs/5020571.article)).


For further information see the seventh case study, Diploma/MPhil in Palliative Medicine (University of Cape Town).

The MedicineAfrica site is [http://www.medicineafrica.com/node/1](http://www.medicineafrica.com/node/1).

See [http://www.mhealthinfo.org/project/malaria-surveillance-mapping](http://www.mhealthinfo.org/project/malaria-surveillance-mapping) for details of the malaria tracking project.


Also reported in the paper by L Alexander, EU Igumbor and D Sanders above.

This was reported by the AMREF e-learning course around nurse training - see p.176 of the Distance Learning for Health report ([http://www.lidc.org.uk/_assets/DL4H%20Report%20Full.PDF](http://www.lidc.org.uk/_assets/DL4H%20Report%20Full.PDF)).

SCORM allows the designers to file learning modules in any VLE or CMS so that the learner can access the intended content. For a full explanation see the section on SCROM in the glossary.

For a discussion of Vula see https://vula.uct.ac.za/portal/site/gateway/page/gateway-200.

The DL4H project was undertaken by the London International Development Centre (LIDC) on behalf of the UK Department of Health. The project comprised a global review of health training at a distance in low and middle income countries and a workshop to discuss benefits and drawbacks of open and distance learning for the health community working in developing countries. The full report, published March 2011, can be found at http://www.lidc.org.uk/assets/DL4H%20Report%20Full.PDF.


Support for answering this question can be found in guidance such as http://learning.staffs.ac.uk/bestpracticemodels/, http://www.toll.ox.ac.uk/research/current/ldse.php and http://www.studynet2.herts.ac.uk/intranet/lti.nsf.


http://www.amazon.co.uk/kindle.


https://www.nhseportfolios.org/Anon/AboutUs.aspx.

For iPad 2 features see http://www.apple.com/uk/ipad/.

For the Samsung web page and description see http://www.samsung.com/uk/consumer/pc-peripherals/notebook-computers/ultra-portable/XE700T1A-A01UK-features.

For the Dell web page and description see http://www.dell.com/uk/p/inspiron-duo/pd.


For an example of the reports on the mobile market see http://www.bbc.co.uk/news/world-africa-15659983.

NB: this symbol used in tables denotes ‘proportional to’.