

# NURSING EDUCATION THROUGH INFORMATION, COMMUNICATION AND TECHNOLOGY

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## **Abstract**

Nurses are front-line health care workers in a district based primary health care system. The shortage of nurses with its impact on health care is well documented. The challenge is how to train sufficient competent nurses. Stellenbosch University is addressing this educational need and has invested in e-Learning products to enhance the training it offers postgraduate nurses.

A blended "brick and click" approach was designed to obtain the optimal blend of e-Learning activities to achieve the outcomes of a range of postgraduate programmes for nurses. This blend includes face-to-face activities, text based materials and activities on web-based learning management systems, activities on the Interactive Telematic Education (iTE) satellite-based platform and Skype. Many prospective postgraduate students living in remote areas often experience barriers which deters access. For these students iTE serves as a convenient technology vehicle to participate in post-graduate programmes. The iTE platform is based on satellite, cell phone and smart card technology and consists of an on-campus studio and twenty five remote learning centres situated across South Africa to create a virtual learning environment to support synchronous teaching and learning opportunities for post-graduate students. iTE allows direct two-way communication between the lecturer and students while a lecture is in progress. Real-time interaction between the lecturer and students which is one of the distinctive attributes of iTE, allows for the collaborative co-construction of knowledge rather than a passive one-way transfer of knowledge which makes it appropriate for postgraduate adult learning. iTE forms a vital component of the postgraduate delivery strategy of the nursing division in its attempts to address the increasing demands for nurse training.

## **Keywords**

Innovation, technology, nursing education, ICT, eNursing.

## **Introduction and background**

In common with other developing countries, South Africa's public health system is characterised by human resource shortfalls, especially in rural areas (van Rensburg, Steyn, Schneider & Loffstadt, 2008). Nurses play a pivotal role in ensuring the delivery of effective and efficient healthcare in South Africa. The primary health care sector includes clinics, satellites and mobile clinics which are nurse based (Daviaud & Chopra, 2008). Since South African healthcare depends on nurses for healthcare in the public sector it is of utmost importance to train nurses appropriately and adequately to address the shortage and

maldistribution of nurses. Nurse training is centralized in towns forcing nursing students to move to these areas. The migration of the nurses to the urban areas inevitably results in resources lost to the rural area since the nurses often do not return to the rural area following their training.

## **Innovative use of technology in a nurse training project**

The Division of Nursing has demonstrated the capability to recruit postgraduate students with an average annual growth rate of 20 -25 % over the past 8 years from a diverse social, educational, generational, class and geographic base. iTE forms

a vital component of the post-graduate delivery strategy of the nursing division in its attempts to address the increasing demands for nurse training.

Yu, Chen, Yang, Wang and Yen (2007) state that e-learning, as a diverse learning style, has been widely recognized in several countries. The learning environment extends beyond the classroom and establishing a technology driven culture is seen as essential to the future of nurse education and the facilitation of life long learning (McVeigh, 2009). Information, communication and technology (ICT) allows for the design and implementation of an eHealth Nursing Strategy to overcome some of the challenges faced with conventional nurse training. These challenges include, heavy family duties, conflict with personal preference, lack of flexibility, staffing shortages created and lack of ensuring teaching consistency nor accommodation of diverse learning needs of students, (Yu et al 2007; Jeffries, 2001). Since the early 1990s, together with the rapid growth of Internet, a number of various applications for e-training or e-learning have been developed around the world (Abramczyk, Lewoc & Izowski, 2005).

Tele-education and telemedicine have been cited as ways of overcoming professional isolation, and the South African National Telemedicine Strategy included tele-education as an important component (Mars, 2009). The use of ICTS's in this project not only encompasses nursing training but also include service delivery. It demonstrates the innovative use of technology in the decentralization of nurse training, *thereby taking nurse education to the nurses*. Yu, Chen, Yang, Wang and Yen (2007) describe the benefits of e-learning in nursing education as achievement of life-long learning, fulfillment of personal interests, time-saving, consideration of job needs, information diversity, flexibility in time and space, self-regulatory learning, cost-effectiveness and less impact on family duties and life. ICT has been viewed as a resource at least as effective as conventional face-to-face teaching methods (Reime, Harris, Aksnes & Mikkelsen 2008; Bloomfield, Roberts & While, 2010). Nevertheless the authors suggest that, If interactive multimedia is to be used, the learning process and tools must be designed to support in-depth learning and not only superficial learning.

### **Strengthening Nursing Education & Practice in South Africa using ICT's**

Information and communication technology (ICT) has a leading role in the distribution of information in South Africa, Africa and around the world. Africa has experienced an large increase in ICT usage the last decade. According to a World Bank report (2007), Africa was rated as the fastest growing mobile network with subscriptions rising from 54 million to almost 350 million between 2003 and 2008. In the decade between 1995-2005 (Smith, 2009) US\$25 billion was invested in the information and communication technologies (ICT) sector in Sub-Saharan Africa, mainly by private operators and investors – resulting in the phenomenal expansion of usage.

The demand for alternatives to traditional educational approaches has expanded more rapidly than anyone could have predicted a decade ago (Seibert, Guthrie, & Adamo, 2004). McVeigh (2009) states that recent trends and current policies guiding the direction of higher education worldwide indicate that effectively embedding an e-learning culture is an essential element to future educational development. According to Tsuda, Scott, Doyle & Jones (2009), traditional textbooks are being augmented and replaced by interactive Web-based and digital media platforms. In surgical skills training for example, video education has become mainstream in the learning of new procedures (Tsuda et al., 2009). Technology can be utilized in new ways to expand faculty and educational resources through strategies such as teleconferencing, enabling additional cohorts of students to benefit from a single lecture (Allan & Aldebron, 2008). The study by McVeigh (2009) suggested that we may still be a long way from the ideal. Potential barriers identified in the study included the functional capability of students, perceived levels of computer literacy, perceptions of e-learning as time consuming, competing home life elements and the lack of work based support.

In 1995, the South Africa government formed the National Health Information Systems Committee, tasked with designing a comprehensive national health information system for South Africa. The Medical Research Council (MRC) of South Africa has a Telemedicine Lead Programme tasked with evaluating existing and planned telemedicine

systems, coordinating national telemedicine activities and establishing tele-education for health care professionals. In collaboration with the University of Stellenbosch, the MRC has developed a primary health care workstation for use in primary health care facilities run by nurses and part-time doctors and dentists (Mars, 2009).

Working in a demanding environment in addition to caring for their families often result in difficulties for nurses to engage and sustain their required learning experiences (Presho, 2006). ICT's could potentially address this shortcoming as a result of its flexibility and availability. This is already evident in various Telemedicine projects that have been implemented abroad and throughout South Africa. A study compared multiple-choice test results of a group of nursing students who used an e-learning program versus another which had a 3 hour long lecture on infection control (Reime et al, 2008). The study found that E-learning has to be viewed as a resource in the same way as a lecture.

Yu et al (2007) investigated the feasibility of developing e-learning examined reasons for adopting or rejecting e-learning as an alternative way to conduct continuing education (CE) for 233 public health nurses (PHNs). The majority of PHNs (88.84%) showed an affirmative intention towards adopting e-learning as their one way of CE. Those who rejected e-learning as their way of CE indicated main reasons as poor computer competence, lack of personal computer and without internet access, heavy work load, heavy family duties, conflict with personal preference, heavy economic burden, lack of motivation, and low self-control. Another study reported on the use of a low-tech telemedicine videoconferencing solution (Skype) as a tool in medical education (Gosman, Fischer, Agha, Sigler, Chao, & Dobke, 2009). The results showed potential in several areas of telemedicine as an alternative solution for introducing students to international health. The study also found that telemedicine facilitated the active participation of more students than would normally have been possible in the operating room.

A Primary Health Care (PHC) telemedicine workstation was implemented at Grabouw Community Health Centre in the Western Cape, South Africa predominantly for teledermatology and

paediatric consultations where nurses were the main users (Mars, 2009). The nurses not only used the PHC workstation for telemedicine consultation but also for skills development. After every telemedicine case is loaded, nurses discuss the response received from the specialist. Nurses have now requested that the telemedicine initiative be expanded to other more specialized areas like mental health, where there is lack of capacity and skills available to attend to this specialty. The main goal of telemedicine is to give health professionals the opportunity of improving their knowledge and clinical skills. Besides medical diagnosis and patient care, telemedicine is used for treatment, health education and Research (Stanberry, 2001).

At the University of Stellenbosch the nursing department has recently embarked on a project looking at various ICT initiatives to strengthen nursing education. These include telematic education, DVD's, online library, e-resources and Skype. The aim of the project is to use ICT's to decentralize nursing education and also capacitate existing nurses in their current settings.

#### **Main components of the existing technology platform at Stellenbosch University** ***Interactive Telematic Education***

Stellenbosch University is addressing the educational need for ICTs and has invested in e-Learning products such as the Learning Management System (LMS) and satellite based Interactive Telematic Education (iTE) systems to enhance the training it offers postgraduate nurses. A blended learning approach is designed to obtain the optimal blend of e-Learning activities to achieve the outcomes of a range of postgraduate programmes for nurses. This blend includes face-to-face activities, text based materials and activities on web-based learning management systems and the activities on the Interactive Telematic Education satellite-based platform. Students who are based overseas and distant places nationally, also have an opportunity to participate through the use of Skype. Skype allows users to communicate by voice, messaging and video conferencing. Voice chat allows both calling a single user and conference calling. A single user call allows for a one on one consultation whilst a conference call includes more than two users.

The enabling properties of iTE are that one can learn without having to travel a long distance to attend classes or seek consultation (Lehoux, Sicotte, Denis, Berg & Lacroix, 2002). Mercur (2010) state that the revolutionary power of eLearning is the combination of a world-wide web connecting the presenters and learners with the immediacy of text, audio and video, as well as interactivity and collaborative sharing. Many prospective post-graduate students living in remote areas often experience that a residential university has barriers which deters access. These include financial constraints, isolation of rural nurses lack of on-campus student accommodation, work environment related problems such as the unavailability of study leave, time, and family circumstances (Penz, D'Arcy, Stewart, Kosteniuk, Morgan and Smith, 2007). For these students iTE enables them to participate in post-graduate programmes and continue with lifelong learning, as the profession requires (Meyer, 2003). The iTE platform is based on satellite with General Packet Radio Service (GPRS) and smart card technology and consists of an on-campus studio and twenty five remote learning centres situated across South Africa to create a virtual learning environment to support synchronous teaching, learning opportunities and quality tutorial for many post-graduate students. Cellphones with GPRS are used to transmit communication from students at remote learning centres to the educator. A smart card stores and transacts data and is stored in a reader (cell phone). Electronic recordings of the iTE lectures (broadcasts) are also made available. iTE students are asked to login with their student cards or by means of their cell phones to register their presence at the different learning centres. By doing so an attendance register is electronically compiled. A complete record of student participation is captured on the iTE database. iTE allows direct two-way communication between the lecturer and students while a lecture is in progress. Real-time interaction between the lecturer and students, which is one of the distinctive attributes of iTE, allows for the collaborative co-construction of knowledge rather than a passive one-way transfer of knowledge which makes it appropriate for postgraduate adult learning (Van der Merwe & Park, 2008).

### **Web-based learning management system**

Blackboard (previously WebCT), a web-based learning management system, is the other institutional e-learning technology that lecturers can use. Stellenbosch University has a long track record of using this type of web-based technology in teaching and learning. The University was one of the first universities in Africa to adopt WebCT in 1999 and the first University in Africa to adopt the Enterprise version of WebCT, WebCT Vista, in 2005. This type of enterprise technology combined with the considerable expertise not only with regards to the technology, but also the educational use thereof over the past nine years, has enabled the University to remain at the cutting edge of web-based teaching and learning.

Turnitin, a software application that checks the academic integrity of students' assignments, is seamlessly integrated into WebCT. Students submit their assignments via the WebCT interface and Turnitin then generates an originality report by comparing the student's assignment with an extensive database of Internet and journal sources. The software reviews the submission for plagiarism and provides a detailed report. The Portal Project at Stellenbosch University (SU) is one of the key projects in the University's broader e-Campus Initiative, a six-year initiative (2002-2007), which is an organised and co-ordinated effort to not only further the integration of ICT into all the University's activities, but to create a "networked" university.

### **Future project scope**

The challenge of increasing the limited capacity of the existing eHealth application is an abiding endeavour. The focus of the project would be to create an eHealth platform to strengthen nursing education especially in areas where no formal nursing education exists in partnership with governmental structures. In so doing it will also create an opportunity to recruit nurses from disadvantaged areas and have better retention of nurses as they will not be taken out their existing environment. It is the vision of the Department of Health in the Western Cape not only to strengthen nursing education but also to create nurses training centres in the largely rural sites of Boland; Overberg; Central Karoo and Eden by 2010. The eHealth platform promises to address the challenge of lack of trainers and training in nursing without

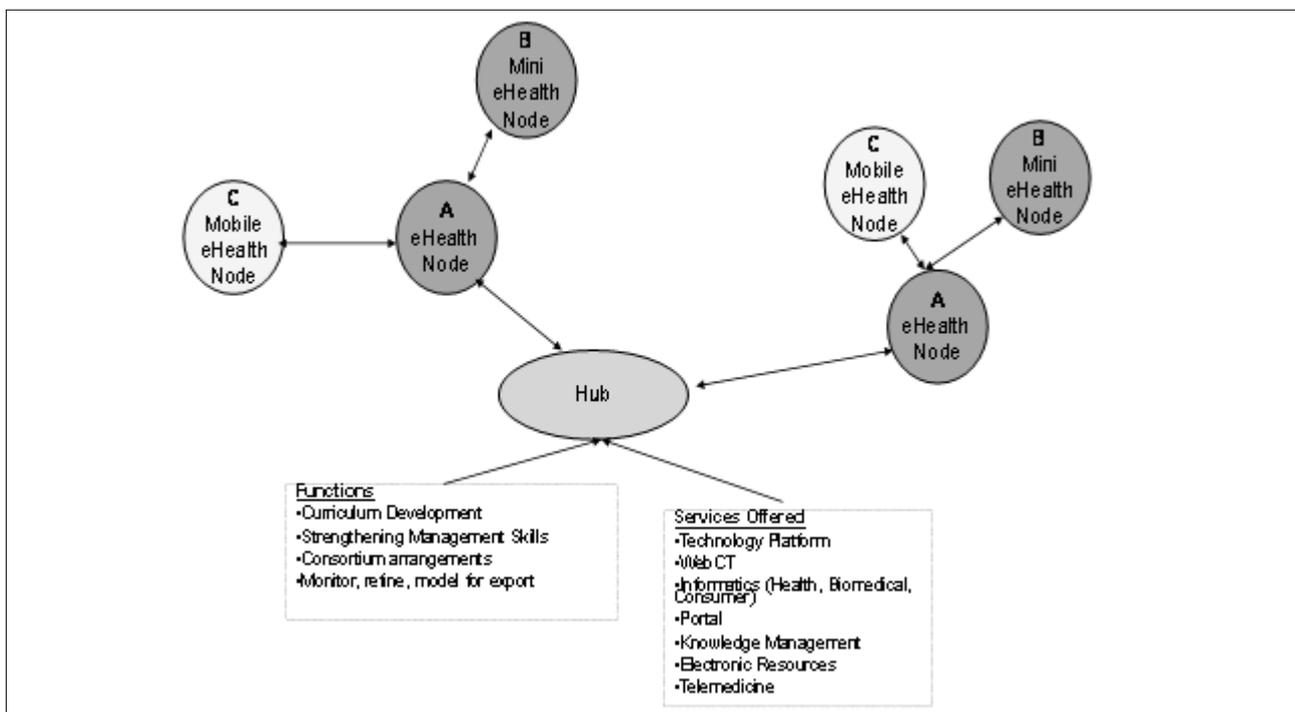
putting major additional strain on the human and financial resources. It is envisaged that this may be achieved by utilization of ICT's such as eHealth nodes, satellite transmission, internet, WebCT and Videoconferencing at several different sites (Table 1).

**Hubs and Nodes**

A hub is a centre that facilitates and support ICT activities. Nodes are centres that are linked to a hub. An eHealth Hub will be developed at Tygerberg Campus of the university. In addition an eHealth Node will be developed in Worcester and George. Two Mini eHealth Nodes and 2 Mobile Skills Labs will also be developed and they will be

linked to Worcester and George respectively. The project life cycle will be over a 4 year period. Within year 1 & 2 there will be a substantial amount of design; development and implementation. Whereas in years 3 & 4 the focus will be to develop a business model which will ensure the sustainability of such an initiative. Evaluation will occur at the end of each year. The project will focus on using existing physical infrastructure to commence the eHealth nodes. The existing infrastructure includes: telecommunications, buildings (e.g. classrooms), computer hardware and software. This project will use cutting edge technology appropriate to South Africa.

**Figure 1: Services to be provided at nodes**



Activities at the hub will include curriculum development, staff development, consortium arrangements, monitoring, evaluation, and refining the Project. **The eHealth Hub** support personnel and services will include: nurse trainers and managers; curriculum development; continuous professional development; eLibrary; satellite broadcasts; audio & video development; WebCT; internet access and videoconference facilities.

**eHealth Node** it is envisaged that this would be hosted at regional health facilities distributed within all districts of the Western Cape. The eHealth node will offer an eLibrary; satellite broadcasts; audio &

video recordings; WebCT; internet access and videoconference facilities. The purpose of the eHealth node would be to recruit and train volumes of nurses. In addition it will also provide continuous professional development to nurses and postgraduate training. The eHealth node will link directly with the hub.

**Mini eHealth Node** should focus on primary healthcare and community health facilities. The eHealth node should provide access to eLibrary; audio & video recordings; WebCT; internet access; videoconferencing. The purpose of the mini eHealth node is to provide support and training to primary

healthcare nurses, postgraduate students and nursing assistants. The mini eHealth node will link to the e-Health node.

**Table 1. Current Status of eHealth Nodes for Nurses Training**

There are currently six satellite facilities available in the Western Cape.

**Table 1. Current Status of eHealth Nodes for Nurses Training**

District	Node	Satellite	Internet	WebCT	Videocon	Cur Dev
Central Karoo						
Boland	Worcester	X			X	
Eden District	George	X				
Overberg District	Caledon	X				
West Coast	Vredenburg	X				
Metropole	Tygerberg	X	X	X	X	X
	Stellenbosch	X				
	Bellville	X				

**Mobile eHealth Skills Lab**

This initiative will focus on providing a mobile eHealth skills lab to allow home based caregivers, possible nursing students and community workers to access information and training where currently there are no fixed facilities. The mobile eHealth skills lab may include an eLibrary; audio & video recordings; webCT; internet access and videoconferencing. The eHealth Hub will be situated and managed by tertiary and academic hospitals. eHealth Nodes will be situated and managed by regional hospitals and the Mini eHealth Nodes will be situated and managed by district hospitals; community health centre and primary healthcare clinics. It is intended that the Mobile eHealth Skills Lab reaches out to district hospitals, community health centres and primary healthcare clinics.

**Conclusion**

The increase in the demand of nursing education calls for drastic measures in training and a shift from the traditional classroom method of training. Studies have shown that ICT can be used to deliver training in nursing with similar outcomes to traditional methods. Access to training of learners in rural areas may be increased through the use of ICT. The major challenge of using ICT is the skills of learners to use the services. The project is likely to increase postgraduate education and training of nurses in the region. Advancement in technology should be used as a tool to enhance teaching and learning and development of skills for nurses especially those in remote and disadvantaged areas.

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