Preparing the Next Generation: Flexible Delivery of Clinically Relevant Health Professional Education

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Abstract: Increasingly eLearning, and multimedia resources are blending with other forms of clinical education to provide experiences that maximise both foundational learning for health professionals, and learning-readiness for the application of this knowledge in clinical areas. Academics within the School of Nursing and Midwifery work with a health-focused team of flexible delivery specialists to develop resources for a diverse student group. Best-practice instructional design, experienced clinical practitioners, and the latest technology have allowed the school to bridge the gap. This presentation showcases a range of eLearning activities developed for an undergraduate curriculum delivered in a multicampus environment. A commitment to using technology such as targeted audio and video, 3D animation, and interactive Flash programming to support pedagogy, provides an opportunity to deliver high quality learning activities.

The Shape of Things to Come

Two forces shaping the international healthcare workforce are also impacting on health professional education. The worldwide shortage of nurses (Duffield, & O’Brien-Pallas, 2003; International Council of Nurses/Florence Nightingale International Foundation, 2006), is ongoing and worsening. Similar challenges face medicine and other allied health-care professions. While figures for nursing shortages in developing countries are critical: the International Council of Nurses (ICN) reported a shortfall of 600,000 nurses in Sub-Saharan Africa in 2005 (ICN, 2005), developed countries are also facing challenges. For example, the ICN reported that the Canadian Nursing Association projects a shortfall of 78,000 nurses by 2011, and the Australian Health Ministers Conference predicted a national shortage of 40,000 nurses by 2010 (ICN, 2005). Secondly, the complexity and intensity of health professionals work is increasing rapidly in association with changes in population demographics, and advances in healthcare and technology (Buchan, 2002) driving a need for increased numbers of work-ready and capable health-care professionals. The crucial nature of the role of clinical teachers in health professional education has been clearly identified internationally (Brown, White & Leibbrandt, 2006). However, consequent upon the current health workforce trends and issues, in nursing there is a relative decrease both in experienced practitioners available to supervise students’ learning in clinical settings and in experienced educators in the higher education sector. These challenges to education are provoking the higher education sector to respond with innovative and clinically relevant ways to prepare the next generation of health-care professionals.

Clinical Contexts and Clinical Learners

Professional education must promote practitioners who have the appropriate clinical skills, are critical thinkers, and have a commitment to lifelong learning in their discipline. These attributes are not merely an ideal, but a necessity in the fast-paced and continually changing world of health care. Spiro, Feltovich, Jacobson, and Coulson, (1992; 1995) investigated clinical learning contexts in medicine and provide a useful explanation of some of the challenges of
clinical learning that can equally be applied in all health disciplines. Spiro et al., (1992; 1995) criticise the assumption that a learning environment should always provide learners with simplified information and skills in all learning situations. They asserted that such a learning environment is sometimes inappropriate for learning in clinical domains, and contributes to failure of learners to reach advanced learning goals in those domains. Instead, Spiro et al (1992; 1995) offered a theory of cognitive flexibility that explicitly recognizes the “complexity and ill-structuredness of many knowledge domains” (Spiro et al, 1995, p. 85). Health professions’ public mandate for clinical practice requires advanced learning goals for an acceptable level of knowledge and skills, where the learner is able to understand and apply knowledge that Spiro et al (1995) asserted has two main properties:

(1) …typically involves the simultaneous interactive involvement of multiple, wide-application conceptual structures (multiple schemas, perspectives, organizational principles and so on), each of which is individually complex (i.e., the domain involves concept- and case-complexity): and (2) the pattern of conceptual incidence and interaction varies substantially across cases nominally of the same type (i.e., the domain involves across-case irregularity). For example, understanding a clinical case of cardiovascular pathology will require appreciating a complex interaction among several central concepts of basic biomedical science, and that case is likely to involve differences in clinical features and conceptual involvements from other cases assigned the same name (e.g., other cases of “congestive heart failure”)
(Spiro et al, 1995, p. 88).

Therefore, advancing the goals of learning entails two conceptual shifts. Firstly a shift is required from attaining superficial knowledge of concepts, to constructing complex conceptual understanding and, secondly, the learner must progress from merely being able to reproduce knowledge, to transferring and applying knowledge (Spiro & Jehng, 1990) in clinical practice. Increasingly, eLearning, and the powerful multimedia resources that it now encompasses, is blending with other forms of clinical education to provide experiences that maximise both foundational learning and learning-readiness for application of complex knowledge in clinical areas in an effort to provide competent and capable healthcare professionals.

A further challenge to health professional education is posed by the changes in learners themselves. Students moving into higher education and the health professions include not only those coming from a modern networked high school environment, but also those who come to professional education later in life and have a multitude of different life and learning experiences and expertise. As Maisie (2007) has pointed out learners in any profession now are both young and old, they may have work experience or they may not, they may be familiar with technology or they may not. But with the possibility of a significant number of students with little or no technological experience, the challenge is to design and deliver content that is both engaging and educationally sound, but also is easily accessible. Younger students generally have the advantage of having to learn only the knowledge and skills of the professional discipline, and do not have to grapple with the technology itself to learn. Many of today’s younger students have grown up using mobile phones, internet connected computers and other media devices to communicate and engage with peers and family. The introduction of such technology to less technologically adept students however, has to be linked to supporting a fundamental change in the way this group relates to learning. Sound pedagogy and a flexible delivery approach that allows for different learning styles, and different learning needs has allowed us to create practical and clinically relevant health professionals education progammes.

**Multimedia Learning**

The ability to transfer and apply knowledge in the clinical context is critical to clinical learning and has been discussed above, the challenge of elearning for students that are new to technology has also been noted. Richard Mayer’s work on cognitive theory and multimedia instruction (Clark & Mayer, 2003; Mayer, 2002) provides a useful framework for understanding how the elearning environment may promote and support meaningful student learning that addresses both these concerns. Mayer’s principles (Mayer, 2002) are derived from assumptions about dual channels (entry to the cognitive system through either visual or auditory-verbal channels), limited capacity (each channel has a limited capacity for holding and using knowledge) and active processing within the channels (such as selecting relevant information, organising and integrating it). Based on these assumptions, the cognitive theory of multimedia learning suggests that using both words and pictures will deepen learning as multiple channels
are used, enhancing capacity through decreasing overload in any one channel, and active learning takes place as words and pictures are connected and linked to previous knowledge in the long term memory (Mayer, 2002). Design principles that deepen student learning derived from this theory include the:

- Multimedia principle: include both words and pictures
- Contiguity principle: present words and pictures simultaneously
- Coherence principle: remove extraneous words and pictures
- Modality principle: words are better presented as narration rather than text on-screen
- Redundancy principle: don’t present words as narration and on-screen text simultaneously
- Personalisation principle: a conversational style of words is better than a formal style
- Interactivity principle: control of presentation rate by the learner assists learning
- Signalling principle: signalling key steps promotes learning


Using design principles that are intended to deepen learning, and promote both the retention of information, and the transfer of knowledge is important for clinical education.

**Flexible Delivery of Health Professional Education**

The academic community within the School of Nursing and Midwifery at Griffith University in Australia work with a health focused team of flexible delivery specialists. Best practice instructional design, experienced clinical practitioners, and the latest technology have allowed the school to bridge a gap between the university and the clinical area. This presentation showcases a range of eLearning activities that have been developed for a curriculum delivered in a multicampus environment in the School of Nursing and Midwifery. The development of a curriculum committed to using technology such as targeted audio and video, 3D animation and interactive flash programming, in conjunction with scenario based learning activities, provides a way of delivering clinically relevant opportunities for learning in an environment that actively fosters learning between students, teachers, and clinical partners; promotes clinical relevance; deepened learning, and critical thinking in a complex discipline. The following multimedia activities demonstrate how eLearning can contribute to a number of the requirements of health professional education, namely, up to date accurate and relevant content, key conceptual knowledge, introduction to the professional culture of the discipline, collaboration with clinical experts, bringing alive the clinical context, and promoting critical thinking and clinical decision making (James & Seaton, 2003). The health focused educational design and development team within the flexible-learning and access services work closely with the academic team to create a structured and relevant course, building on the students’ previous knowledge if possible, or in the case of first-year classes laying the foundations of a structured programme. A close working relationship with the academics coupled with continued consultation throughout the whole design and development process closely follow the Instructional Systems Design methodology, ensuring the development of up to date clinically relevant content.

**Figure 1: Intramuscular injections**
Targeted professionally produced video and audio allows academic staff to reinforce processes and procedures taught during clinical practice. It is also an opportunity for academics to model professional behaviour to students, with media such as video capturing this in a way that a textbook cannot. Access to such media affords students the opportunity to work at their own pace, and review materials a number of times to reinforce their learning. This may be particularly beneficial to students from linguistically diverse backgrounds, where the language of the educational institution is not their first language. Web-based delivery allows students 24/7 access to the material via their course sites.

**Figure 2: The Virtual Treatment Room**

The virtual treatment room is a web-based simulation designed to allow students access to a treatment facility. Students have tasks that need to be completed in order to move on. Vital safety considerations are built into the programme and the student’s progress is halted if they miss an action critical to safety. For example – to gain access to the restricted medications cupboard, the students must first collect the keys from the appropriate place. To enter the treatment room, the student must first wash their hands. In this way important concepts and critical safety considerations are reinforced as the student moves through the virtual clinical area completing activities.

**Figure 3: Changes in foetal circulation**

The changes in foetal-circulation animation reinforces important midwifery concepts and allows the student to identify the changes in foetal circulation from placental oxygen supply to oxygen from the lungs, by encouraging exploration within the animation. The use of Flash-based animation allows us to create interactive media that is targeted to specific knowledge.
Flash-based animation allows the students to see and experience worlds previously unavailable to them. Interaction together with animation allows students to consolidate their knowledge within a safe and risk-free environment.
The use of 3D animation together with interactive programming allows students to view and interact with anatomically correct models. Having the ability to combine 3D models with interactive Flash animation permits developers to simulate the effect of disease over a given time frame. The future potential to allow students virtual access to the body’s anatomy and physiology is only one example of the potential of 3D animation and interactivity for health professional education.

These technologies are being used within the School of Nursing and Midwifery to support specific case–based scenarios and in other areas of health professional education in the university within a problem-based curriculum to meet our goals of educating the next generation of practitioners to have the appropriate clinical skills, be critical thinkers and capable clinical decision makers, and to have a commitment to lifelong learning in their discipline.

References


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