Study of a Mixed Learning Technology Approach for Distance Health & Biomedical Informatics Education: The V-Trainer Pro System

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Abstract: - The practice and process of health care are inextricably intertwined with the management of information. Information technologies have become increasingly necessary for modern practices in medicine, efficient and effective management of health care, and health professionals education. Healthcare professionals recognize an urgent need for skilled scientists who are knowledgeable about both health environment and information technologies. Distance learning technologies have been used for many years to provide medical education to rural physicians. The V-Trainer Pro System is a self-developed innovative virtual training system in health and biomedical informatics for healthcare professionals. The purpose of this study is to research and evaluate the utility and acceptability of a mixed learning technology approach for providing distance health and biomedical informatics education.

Key-Words: - Health Informatics, Virtual Training System, Bioinformatics, Mixed Learning Technology

1 Introduction

In the medical field, where technology advances at an unprecedented rate, life-long learning is a necessity for healthcare professionals. It is often a challenge for healthcare professionals to take time out of their busy schedules to attend conferences or take courses at off-site locations. The time required and cost involved in traveling can be prohibitive.

Our study team is interested in examining the usefulness of a mixed learning technology approach, which combines audio teleconferencing and web-based learning. Physicians and nurse practitioners can access instructional materials before, during, and/or after an audio teleconference through PCs with Internet connectivity.

The goal of our research team is to research and evaluate the utility and acceptability of the mixed learning technology approach for educational purposes in health and biomedical informatics.

2 Definitions

Informatics is the field concerned with the cognitive, information processing and communication tasks of medical practice, education, and research, including the information science and technology to support these tasks [3].

The discipline that involves itself with computers and communication, and their use in biomedicine, is known as *Medical Informatics*. Academic programs in the field have begun to emerge at several medical schools, and formal informatics courses for medical

students are sometimes available. Shortliffe in his textbook has defined medical informatics as: "the rapidly developing scientific field that deals with the storage, retrieval, and optimal use of biomedical information, data, and knowledge for problem solving and decision making. The emergence of medical informatics as a new discipline is due in large part to advances in computing and communications technology, to an increasing awareness that the knowledge base of medicine is essentially unmanageable by traditional paper-based methods, and to a growing conviction that the process of informed decision making is as important to modern biomedicine as is the collection of facts on which clinical decisions or research plans are based" [4].

Biomedical Informatics is a scientific discipline. As a field of study, Biomedical Informatics incorporates the knowledge of the health science (medicine, dentistry, nursing and allied health sciences) with computer science, management and decision science, biostatistics, and engineering and information technologies. Biomedical Informatics involves the integrated use of several approaches and techniques from these sciences to solve problems relevant to health care delivery, health sciences research, health sciences education and clinical/medical decision making. This integration culminates in new knowledge and tools that become the foundations of biomedical informatics. The courses work must include the theoretical foundations as well as the current range of applications of biomedical informatics within contemporary medical and health care delivery systems.

Education is one of the enabling technologies necessary to provide citizens of the world with access to appropriate and continuous health care services anywhere and anytime in the world. An *On-line learning* infrastructure is considered essential for the delivery of educational programs suited to all citizens and health professionals at different levels.

Internet Technology has provided an exciting educational challenge and opportunity. Providing a web-based health or biomedical informatics course has not been without its frustrations and problems, including software compatibility issues, bandwidth limitations, and the rapid change in software and hardware. Despite these challenges, the use of Internet technology has been interesting for both staff and students, and a worthwhile alternative for delivering educational material and advice to students working from their own homes.

3 Materials and Methods

The main components of the web-based learning include web pages for presenting useful material to be included in audio teleconferences, asynchronous computer-mediated conferencing bulletin board, archived audio streaming files, online educational courses in health and biomedical informatics, useful links to online web sites for clinical and patient education material, literature search results and online evaluation forms.

The Mixed Learning Technology Approach include:
- Individualized learning - meeting the needs of all staff, including those working in remote locations, in the home or in small organizations, or whose work requires them to be mobile.
- Personalized learning support - exploring learning pathways and resources, finding the right courses and materials, and tracking work-based learning.
- Collaborative learning - including collaboration between learners on work-based projects or action research and supporting health informatics communities, or health and social care inter-professional groups.
- Tools for educators and employees - e-learning applications support innovation by customizing or creating learning resources or simulations.
- Virtual learning worlds - online master classes, simulations, access to a virtual campus or a wider learning environment.
- Flexible study- on-demand learning, which people can access when and where they need it.
- Online communities of practice - bringing together specialist communities, practitioners, learners, community or voluntary workers, and service users and carers.
- Quality at scale - providing access to e-learning resources and services right across the sector, without variations in standards, which are linked to information, HR and management systems.

The V-Trainer Pro System objectives include:
- Assisting international medical schools in improving and advancing the process of health and biomedical informatics education.
- Advancing the international exchange of

information in the health sciences and in medical education for medical students and healthcare professionals.

- Contributing to the promotion of international understanding and exchange among nations.
- Facilitating the life-long and distance learning for healthcare professionals in health and biomedical informatics.

E-Learning courses of the V-Trainer Pro System feature course slides accompanied by streamed audio and video footage of the presenter. The learners hear a voice-over and see the face of the presenter, making the learning experience more personal.

The main goals of the special courses are:

- To provide an academic overview of the field of Biomedical Informatics.
- To provide an academic overview of the field of Medical Informatics (using computers for the management of clinical information).
- To communicate the key technical issues in informatics through coordinated lectures that cover major themes in the field.
- To reinforce major topics in medical informatics with extended demonstrations of applications and hands-on experience with software programs in a training laboratory environment.
- To describe state-of-the-art research topics through project presentations.

4 Discussion and Conclusions

Education is one of the enabling technologies necessary to provide citizens of the world with access to appropriate and continuous health care services anywhere and anytime in the world. An on-line learning infrastructure is considered essential for the delivery of educational programs suited to all citizens and health professionals at different levels.

Our research group has built a virtual postgraduate level course that will be applicable to professionals working in a wide range of areas within healthcare.

The focus of the courses is on practical issues and very much aimed at the person wishing to retain their role with an increased knowledge and skill level rather than those wishing to specialise as informaticians.

Healthcare professionals are not renowned for an abundance of free time or the option to leave their jobs easily to attend face-to-face courses, and so we looked at distance learning options for delivery of the course.

While there are clearly many benefits and advantages to e-learning, we also need to take into account the barriers, challenges and disadvantages associated with it. These include: high development costs, barriers to access for disadvantaged learners or those with disabilities and the misconception that online learning is a solitary and unsupported activity.

It is particularly important to address any barriers relating to potential users, so that e-learning really does benefit all target groups. To gain full benefit we will need to take steps to guard against a potential digital divide by addressing both access and skills. We also need to achieve the right balance between e-learning and traditional methods.

While e-learning can make a powerful contribution to large-scale engagement in learning, as well as tailoring learning to individual needs, it should not and cannot replace all other approaches to learning. An e-learning strategy should be one aspect of a wider learning strategy.

References:
[1] A. Albert, A. Hasman, Use of the Guidelines for European Curricula, In: "Education and Training in Health Informatics in Europe", IOS Press, p. 51-54, 1995.
[2] V. Maojo, I. Iakovidis, F. Martin-Sanchez, J. Crespo, C. Kulikowski, Medical Informatics and Bioinfomatics: European Efforts to Facilitate Synergy, Journal of Biomedical Informatics 34, p. 423-427, 2001.
[3] R. Greenes, E. Shortliffe, Medical Informatics – An Emerging Academic Discipline and Institutional Priority, JAMA 263, p. 1114-1120, 1990.
[4] E. Shortliffe, Medical Informatics Meets Medical Education, JAMA 1061, p. 1064-1065, 1995.
[5] V. Curran, F. Kirby, M. Allen, J. Sargeant, A Mixed Learning Technology Approach for Continuing Medical Education, Med Educ Online [serial online] 8:5, 2003. Available from http://www.med-ed-online.org
[6] I. Kohane, Bioinformatics &Clinical Informatics: The Imperative to Collaborate. J Am Med Inform Assoc 2000, 7(5), p. 512-516, 2000.
[7] G. Dutton, Computational Genomics: The Medicine of the Future? Ann Intern Med 1999, 16:131(10), p. 801-804, 1999.
[8] R. Bennett, Lecturers' Attitudes Towards New Teaching Methods. The International Journal of

Management Education (LTSN Business, Management and Accountancy Centre), 2,1, 42-58, 2001.

[9] J. S. Daniel, Mega Universities and Knowledge Media, Kogan Page, London, 1998.

[10] C. Duncan, L. Campbell, J. Slater, G. Graham, Using Metadata in Packaged e-Learning Content: Common Practice in the UK. Presented to UK-MEG, 18 April 2002.

[11] D. Leeder, T. Davies, Delivering a web-based course for Cambridge medics: evaluation, issues and outcomes. Presented to TET2001 conference, Prague, 2001. URL Reference: http://www.medgraphics.cam.ac.uk/medsoc/evaluation.pdf