

Mobile Clinical Learning Tools Using Networked Personal Digital Assistants (PDAs)

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INTRODUCTION

The School of Nursing at the University of British Columbia has more than 300 nursing students engaged in supervised clinical practice in hospital and community settings around Vancouver. Likewise, the Faculty of Medicine has more than 200 medical students undertaking supervised clinical experience locally and remotely in the Prince George and Vancouver Island regions. The management of these clinical experiences and the promotion of learning while in an active clinical setting is a complex process.

BACKGROUND

Supporting the students at a distance while undertaking their clinical experience is particularly resource-intensive. It requires the creation and maintenance of good communication links with the clinical and administrative staff, active management, clinical visits from faculty, and the provision and management of remotely based resources. However, there were few existing resources that helped to contextualize and embed clinical knowledge in the workplace in the practice setting (Landers, 2000). A technological solution was developed and implemented using several clinical applications designed for use on personal digital assistants (PDAs).

MOBILE CLINICAL LEARNING TOOLS

A suite of PDA-based tools were created for a pilot study with the involvement of nursing and medical students during the academic year of 2004-2005 to achieve the following objectives:

- To demonstrate the potential use of mobile networked technologies to support and improve clinical learning.
- To develop and evaluate a range of mobile PDA tools to promote reflective learning in practice and to engage students in the process of knowledge translation.
- To develop and evaluate a suite of pedagogic tools that help contextualize and embed clinical knowledge while in the workplace.
- To evaluate the value of networked PDA resources to help prevent the isolation of students while engaged in clinical practicum.

The tools developed provide a mobile clinical learning environment incorporating an e-portfolio interface for the Pocket PC/Windows Mobile (Microsoft, 2004) operating system. They were implemented on i-mate PDAs equipped with GSM/GPRS (Global System for Mobile Communications/General Packet Radio Service; GSM World, 2002). This platform offered considerable flexibility for the project. It supported the use of cellular telephone connectivity and Pocket Internet Explorer Web browser (which has a full Internet browser with support for HTML, XML/XSL, WML, cHTML, and SSL); the i-mate device had sufficient memory for the storage of text, audio, image, and video data, with a large screen and a user-friendly interface with an integrated digital camera.

The tools included a mobile e-portfolio (with a multimedia interface) designed to promote professional reflection (Chasin, 2001; Fischer et al., 2003; Hochschuler, 2001; Johns, 1995; Kolb, 1984). These mobile learning tools were designed to promote the skills of documentation of clinical learning, active reflection, and also to enable students to immediately access clinical expertise and resources remotely. Community clinical placements are being used for the testing domain, as there are currently no restric-

tions on using cellular network technology in these areas, whereas this is currently restricted in acute hospital settings in British Columbia and many other parts of the world.

THE PDA INTERFACE DESIGN

The main interface to the clinical tools was based on a clinical e-tools folder on the Pocket PC containing icon-based shortcuts to a number of specific applications (Figure 1).

The clinical e-portfolio tool represented the major focus for the project, allowing the student to access clinical placement information; log clinical hours; achieve clinical competencies; record portfolio entries in the form of text, pictures, or video clips; and record audio memos. This provides the user with a very adaptable interface, allowing them to choose how they input data. For example, a text-based entry describing a clinical procedure may be accompanied by a picture or audio memo.

The e-portfolio tool also incorporates a reflective practice wizard promoting the students to work through the stages of the Gibbs reflective cycle (Gibbs, 1988) when recording their experiences. This wizard also allows students to record their

experiences with multimedia, including text, audio, digital images, or video input. Once the data have been recorded in the e-portfolio, they can be synchronized wirelessly (using the built-in GSM/GPRS or Bluetooth connectivity) with a Web-based portfolio. The data then can be reviewed and edited by the student or by clinical tutors.

The other icons represent the following applications:

- The synch portfolio icon initiates synchronization of the content of the student's e-portfolio on the PDA with that of a remote server.
- The University of British Columbia (UBC) library icon presents a shortcut to a Pocket Internet Explorer Web access to the UBC library bibliographic health care database search (CINAHL, Medline, etc.).
- The Pocket Explorer icon presents a shortcut to Pocket Internet Explorer for mobile Web access.
- The e-mail icon presents a shortcut to the Pocket PC mobile e-mail application.

The other icons on the screen (Diagnosaurus, ePocrates, etc.) represent third-party clinical software that was purchased and loaded onto the PDAs in order to support the students learning in the clinical area (e.g. a drug reference guide).

Figure 1. Screenshot of the clinical e-tools folder



FUTURE TRENDS

In the future, the PDA will provide a one-stop resource to support clinical learning. Students also will be able to examine their learning objectives, record their achievements, and record notes/memos attached to specific clinical records for later review. Where students have particular concerns or questions that cannot be answered immediately in the clinical area, they will be able to contact their supervisors or faculty for support using e-mail, cell phone, or multimedia messaging service (MMS) communications.

The use of multimedia in PDA interfaces is likely to become much more widespread as the cost of these devices reduces and they become more accessible to a wider spectrum of the population. This already is occurring with the merging of cell phone

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