Nurse Education Today 34 (2014) 457–461

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Distance and devices — Potential barriers to use of wireless handheld devices

Julie Martyn [a,*], Kevin Larkin [b], Teresa Sander [c], Trudy Yuginovich [a], Romina Jamieson-Proctor [a]

[a] University of Southern Queensland, Fraser Coast, Australia
[b] Griffith University, Gold Coast, Australia
[c] Central Queensland University, Learning and Teaching Education Research Centre, Emerald, Australia

ARTICLE INFO

Article history:
Accepted 22 April 2013

Keywords:
Nursing
Digital device
Distance learning
mLearning
Access to information

SUMMARY

This paper reports the findings of a research project investigating the use of iPods by student nurses to enhance their interactions with content, instructors and peers while located at a distance from their university campus.

Wireless handheld devices (WHD) are an important tool in nursing environments that are undergoing rapid technological change. Preferred treatments, drug dosages, postsurgical care, and preventive healthcare regimens continually change and such devices allow students to rapidly confirm information while in the clinical area, thus fostering active learning and safe practice.

A case study approach was adopted with each participating student cohort comprising a case. Multiple data collection methods were used to enable rich descriptions of each case. This paper focusses on factors, relating to the use of iPods, which influenced student learning in distance courses at two regional Queensland universities. It furthermore highlights a range of creative interventions reported by students and educators in resolving issues with their devices.

The study found that connectivity difficulties, technology literacy level, compatibility of study resources with the WHDs, and small screen size were all factors that impacted negatively on the use of iPods in distance courses. The paper describes the responses of students and educators to the use of iPods for learning.

This study concluded that nursing students and nursing educators alike may experience problems when WHD's are introduced to courses as a platform for learning. However, both students and educators can be innovative and resourceful in managing these problems and, when access to course resources that were enabled for viewing on the WHDs were available, the learning experience of the students and the teaching experience for the educators were enhanced.

Introduction

Increasing numbers of nursing students are choosing to study in distance or online mode. Reasons vary, but often relate to busy lifestyles with family and work commitments. Bulky printed materials and media on computers are costly for students to print and limit the times and locations at which they can engage with study. Mobile digital devices, small enough to be 'always' carried by the user, have been developed for business and entertainment. Among such devices, iPods have particular significance because they represent to varying degrees, the convergence of an Internet-connected computer, still and video camera, library, and recording device. iPods offer nursing students new opportunities for greater portability and therefore learning at more convenient times and locations (including whilst on clinical placement), by enabling access to learning materials stored on the device or, subject to network connectivity, to remote interaction with content, teachers and peers (Wu et al., 2012) The devices are less expensive than Smartphones but do not have 3G capability and need to be supported by a WiFi network enabling device. Notwithstanding this limitation, they offer the same educational benefits as Smartphones but at a significantly reduced cost.

This paper discusses factors, identified by nursing students, that impacted their use of iPods to enhance their interactions with content, instructors and peers while enrolled in distance courses at two regional Queensland universities. The reported strategies utilised by the students in managing those factors, and modifications to course design by educators, to facilitate subsequent learning opportunities, will be presented.

Literature Review

A review of the literature suggests a range of contexts in which nursing students might productively use WHDs throughout their nursing programme. This synthesis of research involving WHDs in nursing education was initially guided by four themes identified by Jeffrey and Bourgeois (2011) namely: medication administration, self-efficacy, professional nursing judgement and clinical reasoning.

* Corresponding author. Tel.: +61 7 41943161; fax: +61 7 41943173.
E-mail address: julie.martyn@usq.edu.au (J. Martyn).

0260-6917/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.nedt.2013.04.021

Further interrogation of the literature resulted in the following themes being identified: access to information enabling greater accuracy and efficiency; point of care use of WHDs; student self-efficacy; and clinical decision-making.

The use of WHDs in medical contexts is prominent and in the last decade, handheld computers have become standard equipment for medical students and clinicians as they attempt to cope with an increasingly complex and expanding information base. Early research reported that clinicians rapidly adopted WHDs into their daily practice. For instance, in 2005, half of physicians in the USA reported using WHDs in their professional practice (Baumgart, 2005). More recent research confirms this trend of the rapid uptake of mobile technology with two-thirds of American physicians using Smartphones as of late 2009 with the percentage expected to rise to 81% in 2012 (Sarasohn-Kahn, 2012).

A likely driving force behind this rapid uptake of WHD use is the explosion of the information base underpinning medicine (Johansson et al., 2011). There are over 6000 health applications available for iPods (Sarasohn-Kahn, 2012) with more than 600 applications specifically designed for medical professionals (Phillippi and Wyatt, 2011). Health practitioners are expected to be able to demonstrate high-level information literacy skills including "accessing, evaluating, analysing, and synthesising immense quantities of medical information" (Ducut and Fontelo, 2008, p. 1). The popularity of WHDs for the medical community lies in the ability of medical practitioners, researchers, and students to transport multiple textbooks, manuals, dosage calculators, and other reference texts literally in the palm of their hands (Carney et al., 2004). Jackson et al. (2005) note that physicians and hospital administrators find the devices as invaluable tools for generating patient databases, prescription writing, and information retrieval. Similarly, Koeniger-Donohue (2008) notes that the adoption of WHDs for clinical practice by nurses lags behind that of physicians by approximately two years and consequently it is necessary for educators to address this technology lag by incorporating WHD use in nurse preparation courses. The following section is a brief account of extant research in relation to WHD use by nursing students in clinical environments.

George et al. (2010) suggest that WHDs can result in error reduction, increased valuing of accurate and current information, and enhanced efficiency. In a study of undergraduate nursing students by Jeffrey and Bourgeois (2011), undergraduate nursing students using WHDs ($n = 37$) performed significantly better in medication accuracy in comparison with students using textbooks and calculators ($n = 50$). It is therefore suggested that students using WHDs 'may be more accurate in calculating medication dosages in the medical–surgical clinical environment…and more time efficient in the simulated experience of administering medications than students using textbooks and calculator resources' (Jeffrey and Bourgeois, 2011, p. 47).

A reported positive outcome of WHD use is that they provide excellent access to information at any time and place and that they function as a support tool for when students immediately needed access to information from verified approved sources (Johansson et al., 2011). Cibulka and Crane-Wider (2011) reported that 86% of the nursing practitioner students in their study used WHDs to retrieve data, and 82% used their device to interpret data. Furthermore, 91% used their device to guide prescribing medications, 50% used it to research diagnoses, and 32% used it to interpret laboratory or diagnostic tests. Of particular importance is that 78% of the students indicated that they used their WHD on most clinical days to enhance the quality of their practice at the point of care juncture with patients. Ducut and Fontelo (2008) suggest that student nurses primarily use WHDs as portable sources of information at the point-of-care to improve patient management and augment their own learning. Wu and Lai (2009) note that the use of WHDs not only saved students' time, but also that students spent more time with patients because it was not necessary to leave the patient's room to look up information as the portability of the devices facilitated information retrieval at the point of patient care (Dee et al., 2005; Koeniger-Donohue, 2008). McLeod and Mays (2008) suggest that the ubiquitous wireless connectivity of WHDs, which enables access to online databases of clinical logs, health records, evidence-based guidelines, and peer-reviewed journals, can be leveraged by nursing students to support real-time, evidenced based practice at the point of care. The combination of ready access to current information at the point of care suggests that the use of WHDs may assist students with clinical decision making (Jeffrey and Bourgeois, 2011; Johansson et al., 2011) and improve student understanding of 'the importance of mobile resources in enhancing their clinical decision making' (Wu and Lai, 2009, p.49). Importantly, for students studying nursing in a distance education context where geographic distance can pose further challenges for faculty and students in relation to timely responses to student clinical needs, WHDs may provide a mechanism whereby students and lecturers can communicate over distance in real-time (Wu and Lai, 2009) and where WHDs can serve as psychological support for students whilst in clinical environments (Jeffrey and Bourgeois, 2011).

The literature presented above suggests the necessity for nursing students to develop clinical reasoning skills mediated by WHD. Nursing educators must therefore keep pace with advances in technology, and adopt effective strategies to enhance the learning experience of the students (Ducut and Fontelo, 2008) to ensure, where possible, that students graduate with the technological proficiency to operate effectively in increasingly technologically rich healthcare environments (Jackson et al., 2005). In response to the extensive use of WHD in clinical environments, a number of regulatory bodies have called for improvements in the quality of nursing education. Key nursing organisations such as the International Council of Nursing includes 'technology' in its definition of health informatics used in support of decision-making. The American Association of Colleges of Nursing, the National League for Nursing, and the Institute of Medicine all advocate the incorporation of technology in nursing education (George et al., 2010). They suggest a reform of nursing education to prepare students who are capable of practising in health care environments which require increasingly sophisticated use of technology (Cibulka and Crane-Wider, 2011). The Australian Nursing and Midwifery Accreditation Council (ANMC), as part of the accreditation process for Nursing and Midwifery Pre-registrations courses, states that 'technology, including information technology and information management, to support health care is integral to the curriculum' (ANMC, 2009, p. 13) and further 'that technology is adopted as a tool for learning, practice, treatment and patient management as appropriate' (ANMC, 2009, p. 27).

Whilst the necessity of changing nursing curricula and clinical education practices to improve the technological ability of students is apparent, such improvements need to be based on empirical research into student use of technology; however, current research into the use of WHDs is limited in clinical education. What research has been conducted indicates that whilst students are generally positive about their use, there is little to no research on how to implement, support, and sustain their use across an entire nursing education programme (Koeniger-Donohue, 2008). A systemic literature review by Jeffrey and Bourgeois (2011) highlights the paucity of literature currently available and suggests the subsequent need for primary quantitative studies examining the effect of WHDs in developing undergraduate nursing students' clinical skills. For example, Cibulka and Crane-Wider (2011) report that the provision of informatics content, resources, and skill-building experiences throughout nursing programmes were insufficient to prepare nurses to practise proficiently in a progressively technical and digital health care milieu.

In summary, the studies cited in this synthesis of the literature suggest that WHDs are an important tool in nursing environments undergoing rapid technological change. Preferred treatments, drug dosages, postsurgical care, and preventive healthcare regimens continually