Review

Mobile technology in nursing education: where do we go from here? A review of the literature

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A R T I C L E   I N F O

A B S T R A C T

Background: The International Council of Nurses (ICN), Sigma Theta Tau International Honor Society of Nursing (STTI), and many National Nurses Associations (NNAs), have called for the integration of information technology into nursing curriculums to prepare nursing students for the current practice environment which requires access to large amounts of information to provide evidence-based patient care. Nurse educators have begun to address the integration of technology in nursing curriculum, but are the available tools, in particular, mobile devices loaded with informational applications, being maximized?
Literature Review Aims
The aims of this literature review are to 1) explore the literature written on the use of mobile technology in nursing education; 2) methodically discuss the benefits and concerns involved in using mobile technology in nursing education; and 3) consider strategies for enhancing the use of mobile technology in nursing education.
Review Methods
A search was conducted on the use of mobile technology in nursing programs in Academic Search Complete, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline with Full Text, and Medline Journals. Seventeen studies, published within the last five years in peer-reviewed journals regarding the mobile technology in nursing programs were identified.
Findings
Although many nursing programs have implemented the use of mobile technology in the clinical, classroom, and laboratory settings, more work needs to be done to overcome the concerns related to: cost, lack of IT support, lack of faculty acceptance and role-modeling, lack of structured assignments and/or activities designed to encourage the implementation of mobile devices; and constraints on their use in clinical settings.
Conclusion: While much has been done to incorporate the use of mobile technology in nursing curriculum, nurse educators are encouraged to develop strategies to overcome the concerns noted. Possible strategies to overcome the concerns are discussed herein.

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Introduction

The use of mobile technology, both in personal and professional activities, is here to stay. The need for nursing students to become proficient in the use of information technology (American Association of Colleges of Nursing, 1999; Canadian Nurses Association, 2006; Cronenwett et al., 2007; International Council of Nurses, 1997, National League for Nursing, 2008; Nursing Council of New Zealand, 2010; Sigma Theta Tau International Honor Society of Nursing, 2006) has been identified for some time now. Therefore, studies on the implementation of mobile technology in nursing education are most welcome. This literature review will examine the findings of recent research, including the value of this technology and the concerns related to its usage.

Implications for nursing programs, including actions that might be taken to overcome some of the concerns, as well as recommendations for future research, will also be explored.

Background

Mobile technology entered the general educational environment around two decades ago, and more recently in nursing programs (Swan et al., 2013, p. 192). Su and Liu (2012) mention that "mobile devices are increasingly being used to extend the human mind's limited capacity to recall and process large numbers of relevant variables to support information management, general administration, and clinical practice" (p. 1139) in the nursing environment. Because of the need to access evidence-based information swiftly in health care, personal digital assistants "(PDAs) and other handheld computing devices are becoming a valued addition to the toolbox of information technology

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(IT) resources used by nurse educators" (George, Davidson, Serapilgia, Barla, & Thotakura, 2010, p. 374). Mobile technology in nursing programs has been implemented in the clinical setting (Beard, Greenfield, & Morote, 2011; Brubaker et al., 2009; Chioh et al., 2013; Cibulka & Crane-Wider, 2011; George et al., 2010; Hudson & Buell, 2011; Johansson et al., 2012; Kuiper, 2010; Secco et al., 2013; Swan et al., 2013; Williams & Dittmer, 2009; Wittmann-Price et al., 2012; Wu & Lai, 2009; Wyatt et al., 2010), in the classroom setting (Beard et al., 2011, Brubaker et al., 2009, Chioh et al., 2013; Cibulka & Crane-Wider, 2011; De Marcos Ortega et al., 2010; George et al., 2010; Hudson & Buell, 2011; Martyn et al., 2014; Swan et al., 2013; Wyatt et al., 2010), and in the laboratory/simulation setting (Schlairet, 2012; Swan et al., 2013). Since many studies discuss the high cost of mobile technology, as well as other concerns (Beard et al., 2011; Cibulka & Crane-Wider, 2011; George et al., 2010), it becomes vital for nurse educators to ensure that use of this technology is maximized.

Aims

The aims of this literature review are to 1) explore the literature written on the use of mobile technology in nursing education, 2) -methodically discuss the benefits and concerns involved in using mobile technology in nursing education, and 3) consider strategies for enhancing the use of mobile technology in nursing education.

Review Methods

A search of the literature was conducted on Academic Search Complete, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline with Full Text, and Medline Journals, selected. Three hundred and seventeen journal articles meeting the high-level search criteria were found. Key search phrases and database results are cited in Table 1.

Key terms included "nurses," "nursing students," "personal digital assistants," "mobile technology," and "handheld devices." After eliminating studies more than five years old, duplicates, articles related to non-nursing health care professionals, opinion pieces, published studies involving only practicing nurses and not students, dissertations, and articles on social media, seventeen published studies involving the use of mobile devices in nursing educational settings met the criteria for inclusion (Table 2).

Findings

Benefits

Kuiper (2010) found that implementing technology in nursing programs would facilitate the students' success in current "technology-rich" (p. 13) practice, and that it will increase nursing students' "confidence in computer ability, computer self-efficacy" (p. 11), both of which will help graduate nurses prepare for employment in the present practice environment. Many of the studies in this literature review found that nursing students liked the accessibility to data that mobile devices, loaded with informational applications, afforded them

(Beard et al., 2011; Brubaker et al., 2009; Cibulka & Crane-Wider, 2011; Johansson et al., 2012; Wittmann-Price et al., 2012).

Further, it was discovered that the use of mobile technology improved nursing students' learning and performance in the clinical setting (Beard et al. 2011; Brubaker et al., 2009; Chioh et al., 2013; Cibulka & Crane-Wider, 2011; George et al., 2010; Hudson & Buell, 2011; Johansson et al., 2012; Kuiper, 2010; Secco et al., 2013; Williams & Dittmer, 2009; Wittmann-Price et al., 2012; Wu & Lai, 2009; Wyatt et al., 2010) by providing them with easily accessible, current evidence-based facts. Mobile devices were also shown to facilitate classroom learning (Beard et al., 2011; Brubaker et al., 2009; Chioh et al., 2013; Cibulka & Crane-Wider, 2011; George et al., 2010; Swan et al., 2013; Wyatt et al., 2010) by helping nursing students stay "organized" (Chioh et al., 2013, p. 41) and by providing a way to simply reference information (Beard et al., 2011; Cibulka & Crane-Wider, 2011). Wyatt et al. (2010) found that the students utilized their mobile devices to supplement reading assignments (p. 112), and that the interactions between the teachers and students were improved, which enhanced their learning (p. 112). Schlairet (2012) and Swan et al. (2013) found that mobile devices enabled learning in the simulation laboratory as well. All of these factors have been shown to enhance nursing student success and contribute to competent nursing practice.

Concerns

The considerable cost of mobile devices was seen as a disadvantage (Beard et al., 2011; Cibulka & Crane-Wider, 2011; George et al., 2010; Wittman-Price et al., 2012) to their utility in nursing education. This is particularly troublesome since many nursing students may have limited funding available for their education.

Although information technology (IT) support was implemented to facilitate the use of the mobile technologies as in most of the studies reviewed, some of the studies' participants still spoke of not having enough (Brubaker et al., 2009; Cibulka & Crane-Wider, 2011; De Marcos Ortega et al., 2010; George et al., 2010; Martyn et al., 2014; Swan et al., 2013; Wu & Lai, 2009). Brubaker et al. (2009), George et al. (2010), and Swan et al. (2013) reported that it took faculty and nursing students too long to learn the technology. Small screen size (Martyn et al., 2014) and declining battery life of the devices (Cibulka & Crane-Wider, 2011; Wittman-Price et al., 2012) were also seen as shortcomings.

Beard et al. (2011), Cibulka and Crane-Wider (2011), and Secco et al. (2013) mentioned that lack of faculty development, faculty's resistance to change, and lack of role-modeling by faculty were detriments to nursing students' success in using mobile technology. Swan et al. (2013) discovered that resistance to the use of mobile devices and lack of role-modeling seen in practicing clinicians was also problematic. Swan et al. (2013) additionally noted that the nursing faculty needed more guidance in integrating "the technology into lesson plans, classroom activities, simulations and clinicals" (p. 192). Undoubtedly, nursing faculty must become proficient in, and actively utilize, informational applications on their mobile tools. Nurse educators must also develop specific assignments and/or activities that can be implemented to increase nursing students' proficiency.

Table 1
Search terms and databases used.

Search terms:	"and"	Database:	Number of articles found:
Nursing students	Personal Digital Assistants, mobile technology, handheld devices	Academic Search Complete	24
		CINAHL	22
		Medline with full text	15
		Medline, Journals selected	4
Nurses	Personal Digital Assistants, mobile technology, handheld devices	Academic Search Complete	164
		CINAHL	48
		Medline with full text	40