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Information Literacy in a Digital Era: Understanding the Impact of Mobile Information for Undergraduate Nursing Students

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Abstract. Recent entry-to-practice nursing informatics competencies for Registered Nurses in Canada mean nurse educators need educational strategies to promote student competency within the rapidly evolving informatics field. A collaborative research team from three Canadian nursing programs completed a mixed method survey to describe how nursing students used mobile nursing information support and the extent of this support for learning. The Mobile Information Support Evaluation Tool (MISET) assessed Usefulness/Helpfulness, Information Literacy Support, and Use of Evidence-Based Sources. The quantitative and qualitative data were analyzed to describe students' perspectives and the ways they used mobile resources in learning situations. Findings suggest nursing students mainly accessed mobile resources to support clinical learning, and specifically for task-oriented information such as drug medication or patient conditions/diagnoses. Researchers recommend a paradigm shift whereby educators emphasize information literacy in a way that supports evidence-based quality care.

Keywords. Information literacy, nursing education, mobile information, research evaluation, undergraduate nursing students

1. Introduction

Entry-level requirements for registered nurses in Canada include both computer and informatics competencies^[1] - skill sets that support evidence-based and safe patient care. Incorporation of mobile devices as tools to access relevant healthcare resources and support evidence-based care is a growing trend in nursing practice despite a relative lack of strong research evidence to support this education approach^[2]. Professional education bodies are requiring nursing schools and nurse educators to integrate mobile devices within nursing curricula as a means to promote information literacy. Educators have few guidelines on how to maximize students' use of these devices and how to role-model professional use within nursing^[3]. While the literature contains a wealth of information on the history of mobile devices and their use in

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nursing practice and nursing education^[4], there are minimal guidelines on how educators should best integrate mobile devices to support information literacy and evidence-based practice. In fact, most available literature is anecdotal with few research-based studies^[5]. Another knowledge gap in the literature is whether the use of mobile devices is aligned with the Canadian Association of Schools of Nursing (CASN) entry-to-practice competencies in nursing informatics^[1]. For example, does the use of mobile information resources improve information literacy in a way that promotes evidence-based practice?

Researchers have reported benefits from mobile devices that include improved currency of information for practicing and student nurses, self-efficacy, and access to electronic clinical information, workflow, and drug dosage calculation safety^[6,7]. Students have reported mobile devices as useful sources of quick information for clinical practice^[6], and noted lower stress with preparation for clinical practice^[8].

This paper reports findings from a survey study aimed to fill gaps in the literature related to how nursing students use and evaluate mobile resources in their learning.

2. Methods

This mixed method, descriptive design study explored nursing students' use and satisfaction using a mobile information resource. Ethical approval for the project was received from the three Canadian programs where nursing students were recruited.

2.1 Procedure

A study explanation/invitation was emailed describing voluntary participation, which contained a url link to a secure online survey (<u>http://www.qualtrics.com/</u>) open for a three-week period during May, 2014.

TM The mobile software. Nursing Central (NC) (http://nursing.unboundmedicine.com/nursingcentral), can be downloaded to mobile devices (iPad, Android, iPhone) and the digital resources can be accessed at any location. Five standard nursing quick guides were available (Taber's Medical Dictionary, Davis's Drug Guide, Davis Lab & Diagnostic Tests, Diseases and Disorders) along with Medline Journals and various clinical calculators. The Medline Journal option allows students to access current journal table of contents and, in a wireless environment, complete articles. Small differences across the nursing programs included: (1) use of different add-on information sources, (2) student versus grant funding, and (3) length of time integrated within the nursing curriculum.

2.2. Measures

The online survey collected demographic data including gender, age group, nursing program, year in nursing program, and computer competence level (beginner, intermediate, or expert). Qualitative student perspectives were gathered with text boxes that asked students to provide examples of how the mobile information resources influenced their learning. Students completed the Mobile Information Software Evaluation Tool (MISET) which contains 15 Likert rated items and has three subscales that assess extent of *Information Literacy Support*, *Helpfulness/Usefulness*, and *Use of Evidence Based Sources*. Validity and reliability parameters for the MISET were evaluated with the study data. Internal consistency reliabilities were above the accepted standard of .70 ^[9,10], ranging from .87 to .94. MISET means were calculated with the

student data where all MISET scale items were completed (N = 141-202) rather than use missing values to impute means which means samples sizes vary across statistical tests.

2.3 Data Analysis

At the end of the recruitment period quantitative survey data were downloaded and converted to SPSS version 21 for analysis. Qualitative text box responses were uploaded to Nvivo and coded using content analysis to identify themes. Descriptive statistics (Percentages, Means, SDs) were applied to describe sample characteristics and MISET results. Hypotheses of expected difference were tested using analysis of variance F and t tests of means. Higher mean MISET total and subscale scores were predicted for nursing students with (1) greater computer competence, (2) more senior year in nursing, and (3) younger (less than 26 years old). Senior nursing students are expected to be more information literate and make complex and evidence-based clinical decisions. Students less than 26 years of age include Millennials who have lived among technology, computers and handheld devices^[11]. Older nursing students (>26 years) may experience steeper learning curves adapting to use of mobile device-based information in nursing education.

3 Results

3.1 Sample Characteristics

A final sample of 250 nursing students from Cape Breton University (CBU; n = 90), British Columbia Institute of Technology (BCIT; n = 69), and University of New Brunswick (UNB; n = 91) completed the online survey (Table 1). The sample included students from first (n = 75; 32.3 %), second (n = 68; 29.3%), third (n = 58; 25%), and fourth (n = 31; 13.4%) year of nursing programs. A higher percentage of younger students completed the survey (< = 25 years; n = 122; 62.2%; > 26 years; n = 71; 36.8%). Students were more likely to report 'intermediate' computer competence (n =175; 76.4%) compared with either 'expert' (n = 48; 21.0%) or 'beginner' (n = 6; 2.6%). Almost all students had used a mobile device longer than one year (n = 213; 92.6%) and over half had used NC mobile information software longer than one year (n = 107; 64.5%).

3.2 MISET Means and Differences

The total MISET mean of 3.81 (SD = 0.67) out of a highest possible mean of 5.0 suggested students generally found the mobile software a positive information tool (Table 1). The *Helpfulness/Usefulness* subscale mean was 4.00; item means ranged from a low of 3.98 ('decreased time preparing for patient care') to a high of 4.45 ('information increased my nursing knowledge'). The *Information Literacy Support* subscale was the highest mean, 4.31, and items ranged from a low of 3.87, ('used electronic resources more often than tradition hard copy textbooks') to a high of 4.62 ('helped access needed information'). The mean for the *Use of Evidence Based Sources* subscale was the lowest, 2.86, suggesting the mobile devices were not used to access journal abstracts and/or articles.

Table 1. Mean MISET and Subscale Scores

MISET Scores	Mean (N)	SD	Range
Total score	3.81 (141)	.67	3.67

Helpfulness/useful	3.99 (202)	.85	4.0
Information literacy support	4.31 (199)	.75	4.0
Use of Evidence-based sources	2.86 (181)	1.28	4.0

Younger nursing students (25 years or less) reported higher *Information Literacy* Support (4.44; p=.05) compared with older students (4.20). However, no significant difference for age group was seen on other subscales or total MISET. All total MISET and subscale means were significantly higher for nursing students self-rated as having 'expert' level computer competence. In fact, having 'expert' computer competence was the sole characteristic associated with higher *Use of Evidence Based Sources* (p=.001). A learning curve, or increase in mean scores, was seen across the four years in the program. However, only the difference between first and fourth year students was significant for the total MISET (p=.05), Information Literacy Support (p=.05), and Helpfulness/Usefulness (p=.001). Differences for mean *Use of Evidence Based Sources* were not significant for any year.

3.3 Content Analysis

The qualitative responses supported the quantitative findings; mobile information resources were helpful and supported student learning. Students provided many examples of how they accessed and used mobile information resources in clinical practice. Application of the mobile information was seen with learning about patient medications, patient medical diagnoses and conditions, and informing clinical decisions. While mobile resources were accessed mainly for these 'task' oriented purposes, students reported improved information literacy in increased confidence and lower stress accessing clinical information to apply in practice. So although students did not describe accessing scholarly journals for abstracts or articles, they reported application difficulties when attempting to apply mobile information when completing patient tasks in complex clinical practice situations. This finding is of no surprise, however it warrants the attention of nurse educators who may be inclined to focus solely on information access; in this study, students identified difficulties with the interpretation and application.

4 Discussion

This collaborative research team explored nursing students' perspectives on whether and how mobile information supports learning. Integration of mobile information within nursing curricula is assumed to promote computer and informatics competencies – yet findings from this study suggest information literacy was limited. Student challenges in their use of mobile information were of interest to researchers. In addition, study findings suggested students used mobile information mainly to support patient care-related tasks but did not access research-based journal articles to support evidence-based practice. This finding was evident in both quantitative and qualitative student responses across all three nursing programs. The qualitative findings suggested students mainly used and applied the mobile information resources in clinical practice learning as most of the examples provided were based in clinical settings. Through an in-depth analysis, it was unclear whether this limited access was due to lack of awareness that the mobile resources allowed access to scholarly journals and/or a devaluing of theoretical and research-based nursing knowledge. Interestingly, although all students across all three nursing programs reported low use of journal articles and abstracts, one nursing program reported significantly higher use. It is important for future research to assess whether nurse educators are praxis-oriented and encourage students to apply current research and nursing theoretical knowledge in clinical learning situations.

In this paper, researchers examined students' use of mobile devices to access and use information to support their learning and promote higher level nursing information and knowledge. Researchers propose that the time has arrived to evaluate if mobile information promotes student informatics skills and abilities as defined by the Canadian Association of Schools of Nursing's entry-to-practice competencies^[1]. The timeliness of this research is evident as researchers emphasize the importance of linking information access to nursing knowledge development – a learning domain that is made possible when nurse educators foreground information rather than technology.

Using Nelson and Staggers^[12] work, researchers suggest concrete teaching and learning strategies for educators to foster nursing students' information literacy and evidence-based practice. These suggestions are offered within the domains of tacit, experiential knowledge and higher level nursing knowledge and wisdom. Educators need to promote student information literacy – a basic nursing competency required to support nursing excellence in a digital era.

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