

# Application of mobile device technology in baccalaureate nursing education

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Developing a successful educational tool to maintain clinical decision support is contingent upon overcoming faculty concerns prior to system development and implementation. Specifically, incorporation of necessary faculty training to address issues to increase faculty knowledge and skills, and encouraging integration of information technology (IT) skills within the nursing curriculum must be given careful consideration.

Encouraging integration of IT skills is one of the Technology Informatics Guiding Education Reform (TIGER) Initiatives. Progression of the TIGER Agenda created and comprised at the TIGER Summit, is essential for launching and enabling “ practicing nurses and nursing students to fully engage in healthcare’s emerging digital era” (Sensmeier, 2007, p. 2). Examples of advanced solutions for enhancing decision making includes technological tools such as, an electronic medical record (EMR) as well a mobile device.

In addition to the electronic medical record, integration of medical technology includes providing the best electronic resources to students and practitioners striving to achieve the highest quality care, increase accuracy and productivity, decrease medical errors and integrate evidence into nursing care. The incorporation of electronic clinical decision support into the daily practice of caring for patients should be the standard of care for practicing RNs, with initial exposure coming in the basic educational program.

Quick access to healthcare information supports clinical decision making and validates optimal practice( Muench, 2008). Integration of electronic clinical

decision support into the daily practice of caring for patients will enhance optimal outcomes for all stakeholders. There are a variety of proven methods that can accomplish integration of clinical decision support into practice anywhere, at any time. However, there still remains the challenge of identifying creative access methods to reach clinicians.

Every venue of care--from busy urban emergency department to the rural healthcare settings-- need to utilize evidence based data to enhance the care and well-being of everyone involved. A mobile device educational program for all faculty and students is proposed to transform a technological and informatics gap within the school's curriculum. The mobile device program is unique among hand held devices traditionally utilized in educational programs in that it incorporates multiple functions on a single platform with data transfer capability.

It will be utilized in didactic courses, labs and clinical practice. The mobile device provides 5 integrated clinical and educational features: \* An electronic clinical reference tool with the software bundle containing a clinical laboratory/diagnostic reference book, a medication reference book, a medical dictionary, nursing process and a disease and disorders text, access to evidence-based references, and a linking tool that integrates all the resources with one another. These references can be updated daily throughout the student's enrollment via a site license. A means to access school email and the school's course management system allowing students to download course assignments, simulation lab videos, and lecture material;

\* A classroom course-response device which allows students to communicate feedback on lecture content in real time and to answer in-class quizzes electronically \* An electronic clinical journal function allowing students to document their clinical experience with a patient (transmitted via WiFi to faculty for review) and this mobile device based journal assists faculty in developing student's basic documentation skills in preparation for using electronic medical record (EMR) charting utilized by area hospitals. The proposed initiative will be the means which will transform the technological and informatics gap within the CON curriculum. The goals of this endeavor include: (1) increasing faculty proficiency in technology and informatics skills, (2) teaching students documentation skills for future practice in an electronic medical/health record environment and (3) providing a mobile electronic clinical reference and evaluation tool to enhance decision making.

Perrault and Metzger(1999) identified four key roles of decision support systems, which will be used as a framework for this project: Administrative - as students document clinical experiences, it will allow course directors to assess aggregate learning outcomes and use clustering tools to assess patterns of experiences and student levels of achievement. Managing Clinical Complexity and Details - Students are assigned to a variety of clinical experiences with both full time and adjunct faculty. The tool will allow more immediate access to electronic communication, although the wireless function of the PDA will need to be turned off while students and faculty are in the clinical agencies.

It will allow the faculty to develop reports and queries to better understand the ways that students incorporate this technology. Cost Control- better tracking of skills and completion of assignments, which may allow for better use of limited faculty resources. As the system is populated, data mining will be undertaken to identify the most effective clinical and learning experiences in order to evaluate and modify the overall educational program. Decision support, supporting clinical diagnosis/treatment plan processes; and promoting use of best practices, guidelines, and population-based management. ". - as students develop plans of care, they can use the tools to explore evidence-based interventions.

They will also access critical reminders about quality and safety issues, especially related to medication. This will be key in community agencies where faculty is less available to the student. Live group, 1: 1 training sessions and a web based user guide will demonstrate to faculty how to make use of this DSS to monitor and comment on students' clinical logs and check offs. Faculty will be able to generate reports by student, course, location, intervention, and skill. The web based user guide will allow students 24 hour, seven days a week or continued access on how to manage their clinical logs, check offs, and feedback. There will be live group educational sessions on campus and at clinical sites.

A data repository will be constructed to house structured elements that will form the basis of a simulated electronic medical record. As the students enter documentation from simulations and care experiences, classification and sequence discovery activities are thought possible (Turbin, Aranson,

Lang, & Sharda, 2005). As previously discussed, a mobile device educational program for all faculty and students was proposed to transform a technological and informatics gap within the school's curriculum. A process of selection and administrative approval was undertaken. The following implementation plan and evaluation strategy was devised. An ad hoc committee compiled a 'wish list' of innovative technologies to catapult the department into the 21st century.

After an exhaustive literature search was conducted and approval from the Dean and chief financial officer (CFO) was obtained a personal digital assistant (PDA) Implementation Committee (PIC) was initiated. This committee included faculty and students from all levels in the undergraduate program. The mission of the PIC included: 1. identification of software congruent with program goals and to serve as evidenced-based references for the students; 2. review PDAs and decide whether to require a specific PDA or allow students a choice of type; 3. determine where in the curriculum PDAs would be integrated; and 4. identify other innovative uses for the PDA technology such as data management and competency validation.

The PIC reviewed proposals from three vendors, Skyscape™, Unbound Medicine™, and PEPID™, before selecting the Nursing Central software, from Unbound Medicine™. The committee believed this software was the most robust, and incorporated the nursing process, patient teaching, home care considerations and discharge planning. Unbound Medicine™ also offered complimentary software for faculty and provided in-service opportunities for students and faculty. A subsequent decision was made to allow students to

choose any Apple, PALM or Windows-based PDA Smartphone. It was decided that students would be required to incorporate PDAs and software into the first nursing course with a clinical component.

As students progressed in the program, PDAs and accompanying software would continue being utilized. With this new technology it was necessary to develop several processes and procedures for the clinical settings. These new requirements were outlined in the clinical syllabus and included the need to disable phone, Wi-Fi, and camera functions in the clinical setting. A PDA Initiative Site was launched with information for students and faculty about the software and hardware requirements. This site was housed within the BlackBoard™ content management system providing resources for faculty and students and serving as a discussion board to address frequently asked questions (FAQs).

Resources found on this site included free software to complement the required Nursing Central Software, handouts on how to load and use the required software, information on how to reference the software found on the PDA, video training, YouTube training, email setup directions, information about updates to the required software, and instructions to copy course materials to the PDA. The faculty received monies from the Dean to purchase a PDA so that they could model the use of decision support technology for decision making with their students. The Fundamentals syllabus included the requirement for the PDA Nursing Central software; by incorporating this requirement into the syllabus, students were able to have this expense covered by financial aid.

The first week of class during the ' frontloading' skills day, a mandatory in-service on the PDA and software capabilities for students and faculty was provided. This training was video captured and archived on the PDA Initiative Site. The coordinator of this initiative was available to faculty and students 24 hours a day, seven days a week. The PDA coordinator visited every clinical site and worked with both the student nurse and their preceptor to reinforce the need for preceptors to query students regularly using the PDA technology. During these visits, the resource person highlighted how each component of the software is linked and how to utilize this information to support evidence-based practice. These site visits also increased interest among the staff nurses.

Post conferences were designed to incorporate information seeking activities such as how to retrieve, utilize, and apply knowledge gleaned through the PDA software. The software chosen integrates culturally sensitive evidenced-based recommendations based on gender, age, and race. In addition, the World Wide Web Consortium's guidelines for disabilities (WC3, 1999) were utilized in the software and in the site development. These guidelines address: text equivalents for images; graceful transformation between screens and tables; larger fonts or computer magnifying screens; and highlighting hyperlinks for easy navigation. For the purpose of this paper, Knudsen's definition of evaluation will be used: " the process of assembling evidence that a system meets, or fails to meet, a prescribed assurance target.



A comprehensive evaluation will be conducted at the end of the first term of use as well as at the end of the first full year of implementation. The objectives of the implementation plan are to: \* Measure changes in student information seeking behaviors using a standardized instrument approved by the university IRB. \* Identify student use of clinical faculty resources before and after implementation. \* Utilize heuristic evaluation where the researcher evaluates the human-computer interface & judges the quality of the interaction through direct observation of student-preceptor-client interactions \* Determine the cost-benefit ratio of the new technology

If the implementation is successful, the implementation would be encouraged by several desired outcomes: a) An examination of pre and post student survey would indicate PDA usage enhanced clinical and classroom learning experiences; b) Students will find the PDA strategies useful and will list searching the PDA for evidence as a primary learning strategy rather than asking the clinical instructor or another staff nurse; c) At the end of the first year, students will continue using electronic reference systems to support decision making while in practice as a professional nurse; d) Clinical and classroom faculty will report not only a reduced number of interactions with students after PDA implementation, but also an improved quality of interaction with the student;

e) The student will be able to independently find evidence and factual information and the dialogue with faculty will be more related to priority setting and selection among evidence-based alternatives; f) To achieve full student acceptance of the technology, a minimum 50% cost reduction in

textbook fees is achieved, excluding the purchase price of the PDA, when necessary; g) Not essential however, incorporation of this technology by hospitals where students engage in clinical learning activities.

To teach and prepare nursing students for 21st century nursing, nursing faculty must be motivated to go beyond the antiquated models of instruction to not only improve computer and information literacy skills but to accentuate informatics competencies. In the future, nursing schools will not have the benefit of ignoring technological deficiencies because students will not be adequately prepared for an “informatics-intensive health care delivery system” (Skiba, 2009, p. 335). Therefore, with this mobile device educational program the future is being addressed now.