Technology-Based Strategies for Promoting Clinical Reasoning Skills in Nursing Education

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Faculty face the demand of preparing nursing students for the constantly changing health care environment. Effective use of online, classroom, and clinical conferencing opportunities helps to enhance nursing students’ clinical reasoning capabilities needed for practice. The growth of technology creates an avenue for faculty to develop engaging learning opportunities. This article presents technology-based strategies such as electronic concept mapping, electronic case histories, and digital storytelling that can be used to facilitate clinical reasoning skills.

Keywords: clinical reasoning; digital storytelling; electronic case histories; electronic concept mapping; teaching methods; technology

The health care environment continues to evolve at an unprecedented rate. While the essential characteristics and goals of nursing remain unchanged, the delivery of nursing care is influenced by the increased diversity of health care needs and the increased complexity of medical interventions. The changing practice environment requires new nursing skill competencies. Nursing graduates are expected to have skills that emphasize leadership, health policy, system improvement, research and evidence-based practice, and teamwork and collaboration. The nurse educators need to consider their current instructional methods to determine if they are meeting learning needs. Educators should identify methods for developing a diverse group of professionals who are self-directed and able to synthesize information, link concepts, think critically, and translate newly gained knowledge into the complex and changing practice environment.

Nursing education needs to move away from the teacher-centered content-laden classrooms and include pedagogical approaches that cultivate clinical reasoning. For nursing students to learn how to manage complex clinical scenarios effectively, they should be engaged in the learning process in which classroom and clinical content are linked. This article suggests strategies for using technology to facilitate the development of students’ clinical reasoning capabilities in nursing education.

Clinical Reasoning
Clinical reasoning involves the collection of cues, processing information, arriving at an understanding of the patient problem, planning and implementing appropriate interventions while considering alternative actions, evaluating the proposed outcomes, and reflecting on the clinical reasoning process. The nurse who has effective clinical reasoning skills will most likely have a positive influence on patient outcomes. Conversely, the nurse with poor clinical reasoning skills will most likely fail to detect cues of impending patient deterioration, thus potentially resulting in adverse patient outcomes. The decisions that nurses make relevant to the individual health care needs of the patient are supported both by intuition and knowledge gained from professional experience. Nursing students are novice thinkers beginning their work as health care professionals. Therefore, these students need assistance with application of theoretical knowledge to specific clinical situations, and nurse educators should be compelled to assist nursing students in developing their clinical reasoning skills.

Teaching clinical reasoning often presents challenges for nurse educators. Facilitating the development of this skill requires a different approach than what is used when teaching the skills needed for routine nursing procedures. The development of clinical reasoning abilities does not happen by chance alone. Instead, clinical reasoning is a learned process that requires the student to use critical analysis and synthesis with reflective considerations when faced with a clinical scenario. Faculty can incorporate educational approaches that help students identify cues and the need for action while analyzing and evaluating information. However, traditional teaching approaches may not always facilitate the development of a required level of clinical...
reasoning proficiency. The use of teacher-centered methods often leads to bored and unstimulated students.9 On the other hand, the use of innovative strategies that use technology may positively influence the student’s ability to obtain, analyze, and organize information from a variety of sources in a meaningful way to bring about purposeful decision making while engaging students in a relevant and useful way.10, 11

Technology Use

Incorporating the use of technology in pedagogical practice creates an environment in which students learn through the exploration of making and creating rather than from the consumption of content.12 Implementing teaching and learning strategies that require technology can be used to bridge the gap between classroom and clinical experience. The use of such methods may assist nursing students in developing clinical reasoning skills that demonstrate the analysis of various cues, formation of assumptions, and application of evidence-based information in practice. Given the use of technology by current nursing students, faculty should consider how technology could provide a mechanism to aid in the development of clinical reasoning skills. Technology may help millennial students succeed by capitalizing on their desire to remain connected to their social circle, engage in discovery, and work with others.13 Electronic concept maps, electronic case histories, and digital storytelling are used to illustrate how technology can provide opportunities for clinical reasoning development in nursing education.

Electronic Concept Maps

Concept maps provide students with the opportunity to graphically display concepts or ideas.14, 15 Usually a main concept or topic serves as the central organizing component of the concept map. Students use circles and boxes that are linked by words and phrases to the concept to illustrate the topic in a visual and schematic display.14, 15 These concept maps are typically used to show how complex concepts are related and provide a visual representation of the idea. Creating concept maps helps students organize information, guide thinking. The literature suggests that learners creating concept maps are engaged in metacognition, reflect upon the concept, gain insight, and consider how knowledge could be transferred into clinical practice situations.15, 16 Although demonstrated as a useful strategy in promoting clinical reasoning, concept maps may be viewed by students as only an academic activity. Many concept maps are constructed by hand in a traditional paper-and-pencil approach. Students may find it difficult to see the application of this knowledge or struggle to make changes or modify the concept map as new information is presented or ideas change. Many times they are used for a single activity or assignment and never revisited. These hand-drawn concept maps make the learning an isolated activity for a single student and do use collaborative learning for millennial students who desire engagement, active learning, discovery, and working with groups.13

One alternative approach to concept mapping involves the use of software or computer applications such as Inspiration (http://www.inspiration.com/) and Bubbl.us (https://bubbl.us/) that allow for the electronic creation of concept maps. Students can use their computers, iPads, and even cell phones to create visual representations of clinical content. The electronic creation of concept maps allows for a more fluid concept map creation permitting easy edits and changes, retrieval of information, and updating of the concept map throughout a nursing program. Another major advantage is that the use of concept mapping technology allows for the creation of more informative and resource-laden resources. The electronic concept map can include linkages to audio or video files, Web page hyperlinks, the use of symbols and images, and note attachments. When designed as part of a larger learning plan, these resource-rich learning tools facilitate a collaborative learning opportunity between students.

When incorporating electronic concept maps as part of a class or a clinical conference, there are some important considerations that faculty should address. For example, faculty need to assess the software or applications that will be used; some are free, whereas others have nominal charges. They should ascertain if the selected electronic resources will meet class or clinical conference needs. It also is important to determine if students must set up accounts and have access to specific delivery platforms for use (eg, type of phone operating system or hardware). Students need time to learn how to use the software, and faculty should ensure there is technology assistance available to students if questions or problems arise.

Faculty also should consider how to incorporate concept maps into their teaching. Careful consideration should be given to complex concepts that students often struggle with understanding or experience apprehension with care in the clinical setting. For example, the nurse educator could introduce the concept of diabetes mellitus in the classroom setting. A concept map could be started in the classroom in which students identify the theoretical content related to this condition. An example is provided in Figure, Supplemental Digital Content 1, http://links.lww.com/NE/A183. The students then could return to their concept maps in a clinical conference to add or modify information based on the clinical learning experiences. Figure, Supplemental Digital Content 1, http://links.lww.com/NE/A183, shows the empty boxes that could be completed after a clinical assessment. A condition such as diabetes mellitus may appear throughout the life span, and a student’s concept map could be updated as new content is learned throughout coursework and clinical experiences. Revisiting and updating the electronic concept map provide a way to show how concepts are connected and scaffold the learning while building knowledge over time.

Electronic Case Histories

Another approach that may be effective in developing clinical reasoning skills in nursing students involves the use of electronic scenario-based health cases. Case histories have been used to facilitate clinical reasoning in advanced practice nurses, physical therapists, and other allied health disciplines.17, 18 However, just presenting a case history of a patient may be insufficient for learning as development of clinical reasoning requires a connection to clinical practice.19 Incorporating technology into a case history can help to contextualize the situation and engage the student in meaningful learning. Using podcast audio recordings, embedding hyperlinks, or incorporating graphics, images, and video clips
into a case can bring reality to the scenario and make the learning activity meaningful for the student. Including extraneous data and situational information and incorporating sequential development of the case allow the clinical situation to unfold and require that students use judgment, establish priorities, and cluster information, all part of clinical reasoning.

When designing technology-rich case scenarios, there are a variety of factors for faculty to address. As with any learning activity, the case needs to link to course and program objectives and outcomes. Faculty need to decide whether the learning experience will be for an individual or small group activity as this may affect case development. They should be sure to articulate to students clear guidelines and expectations of the learning experience and ensure that students have the necessary technology skills to engage in the case situation.

Faculty also should consider how the case can be used online or in the classroom and in a clinical conference. For example, unfolding the case in both learning environments facilitates the translation of newly gained knowledge to clinical practice. A case regarding renal failure could be introduced in the classroom setting or online environment. Students could access pictures of uremic frost on the Internet and review a YouTube video about causes of renal failure. During clinical conference, the students could retrieve information through online repositories regarding evidence-based practice initiatives directed toward care of the client in renal failure. Faculty would incorporate discussion questions at strategic points to ensure that students are identifying critical concepts throughout the learning experience. The case would continue to unfold in the 2 learning environments until the learning objectives are achieved. Once the case is concluded, students should have an opportunity for reflection and debriefing to encourage the review of key concepts.

Digital Storytelling

The growth of Web 2.0 has allowed computer users to easily capture, manipulate, and share images electronically and to network with others. With these technological developments, faculty can now consider innovative educational strategies that capture students’ desire for visual learning, technology use, and networking. One approach faculty can consider involves digital storytelling, which combines digital content to illustrate topics for instructional or persuasive purposes. The uses and benefits of digital storytelling in nursing education are already documented in the literature. In general, digital stories promote communication, collaboration, and reflection. Through the use of digital media, rich discussions can be facilitated that encourage the development of the core components of clinical reasoning: collecting cues, processing information, and arriving at a conclusion. However, nurse educators and students may find using traditional computer programs and software for digital storytelling creation cumbersome and time consuming.

Instagram, a popular cell phone application, provides an ideal alternative platform for digital storytelling, allowing users to quickly capture and share events and objects instantaneously. Instagram (http://instagram.com), a mobile app, allows smartphone users to quickly and easily post pictures, videos, and photo stories while socially connecting and sharing materials with others. This free cell phone application appeals to younger adults and college aged students and has grown quickly since Facebook acquired Instagram in 2012. Instagram use among adults has grown from 28% in late 2012 to 37% in 2013. Instagram provides the advantage over other social media sites in that users have a high rate of engagement. Fifty-seven percent of Instagram users check the application on a daily basis, thereby making it an application that students may regularly use.

Students can be encouraged to use Instagram as a teaching-learning strategy to illustrate nursing concepts by creating and posting photographs that they have taken with their cell phones, or students can post photographs that they have located online. Digital storytelling via Instagram can be incorporated online, in the classroom and with clinical conference learning activities. For example, in preparation for a discussion about anaphylaxis, the nurse educator could create a digital story on Instagram and share pictures related to causes, signs and symptoms, and treatments. As part of a scheduled class or clinical conference, students could be instructed to prepare and share a 1-minute discussion regarding evidence-based nursing practice related to the digital story. Digital stories with Instagram could also be used to evaluate the application of new knowledge. Another Instagram teaching-learning activity could involve students creating a digital story and posting photographs of environmental hazards identified during a community assessment after a formal class discussion of public health concerns and their impact on population health. Figure, Supplemental Digital Content 2, is an example of community environmental assessment photographs using Instagram, http://links.lww.com/NE/A184.

Creating a digital story requires students to critically consider the topic, obtain and organize content, and synthesize concepts in a meaningful way. However, faculty need to address important issues if incorporating digital storytelling as a teaching strategy for developing clinical reasoning. Because Instagram is a cell phone application, faculty need to determine if all students have cell phones available for use. Faculty should consider developing this assignment as a group activity so that students who may not have the necessary technology can still contribute to the digital story creation. Prepare students to use Instagram by instructing them to download the application, create an account, and establish a profile.

Because Instagram postings are publicly viewable, faculty will need to share information with students about the National Council of State Boards of Nursing recommendations for nurses’ use of social media. Students need clear and specific guidelines about appropriate mobile device and social media use, intellectual property use issues, and maintaining patient privacy and confidentiality. Students need to know how to identify copyrighted material on the Internet and use appropriate public domain photographs for their Instagram activities (Figure, Supplemental Digital Content 2, http://links.lww.com/NE/A184). They should be instructed not to post any identifiable patient information, patient name, or patient image as part of their digital story. Students need to know about the consequences of disclosing inappropriate information and be aware of state and federal laws and professional standards that may govern their actions.

Faculty should review with students any additional institutional policies about cell phone and social media use.
They should also remind students about the permanence of postings and careful selection of appropriate images and content. Faculty can encourage students to be creative and to use the technology to capture and share their stories that demonstrate learning. Lastly, faculty can use the social media aspect of this activity, encourage students to like and comment on classmate photographs and stories, and guide students in using hashtags to connect with others.

**Summary**

Faculty face many challenges in nursing education as they prepare students for professional practice. Incorporating technology into classroom and clinical conferencing activities may provide additional teaching and learning approaches that engage millennial students in meaningful and relevant learning. Strategies such as electronic concept maps, electronic case histories, and digital storytelling may provide useful approaches for promoting the development of nursing students’ clinical reasoning capabilities.

**References**